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VOLUME XXIV NUMBER 6

THE AGRICULTURAL STUDENT

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FEBRUARY 1918

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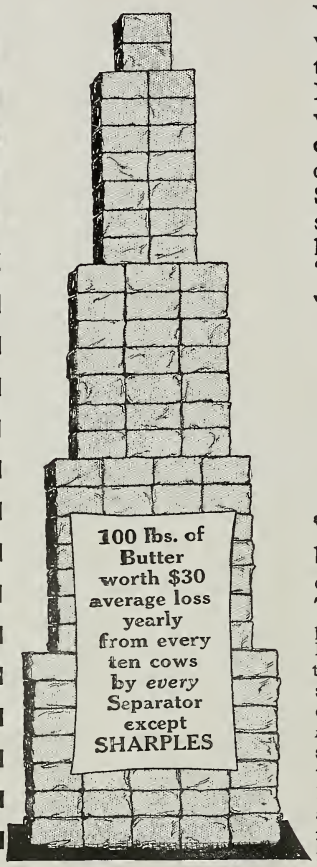

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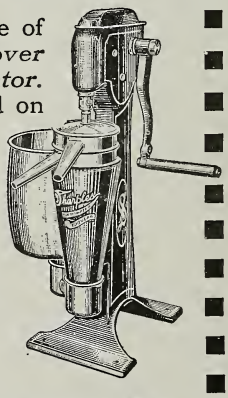

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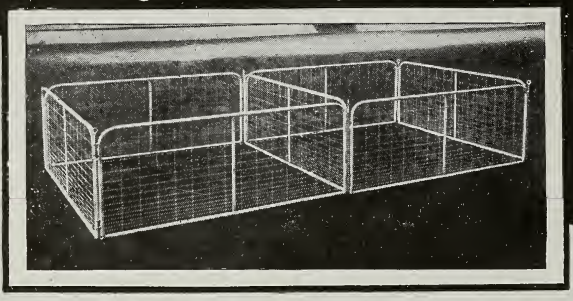

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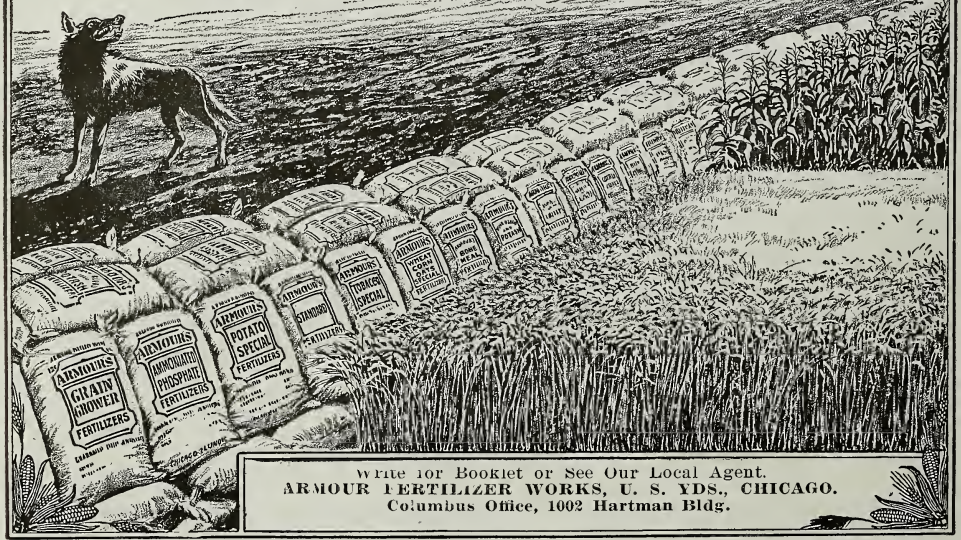

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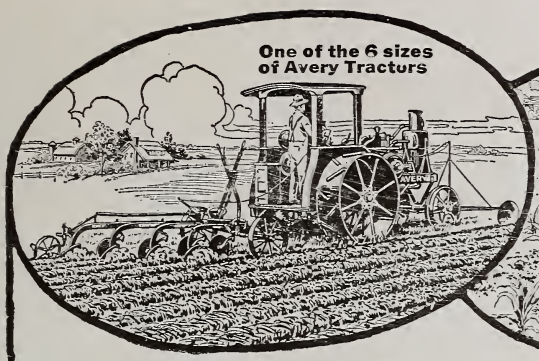

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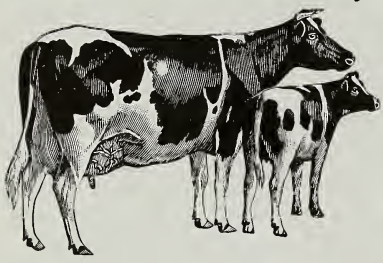

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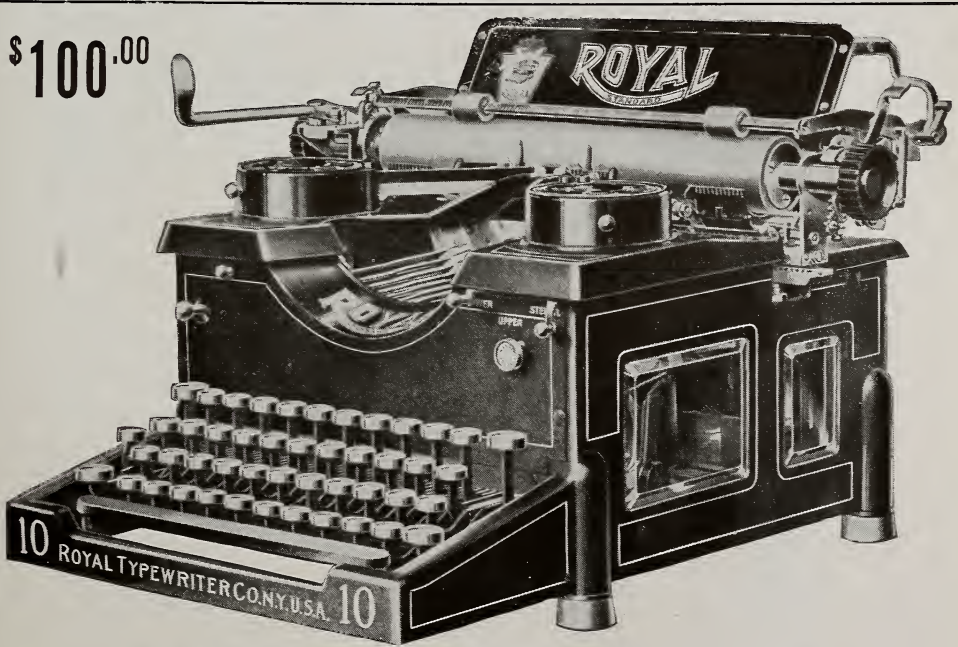

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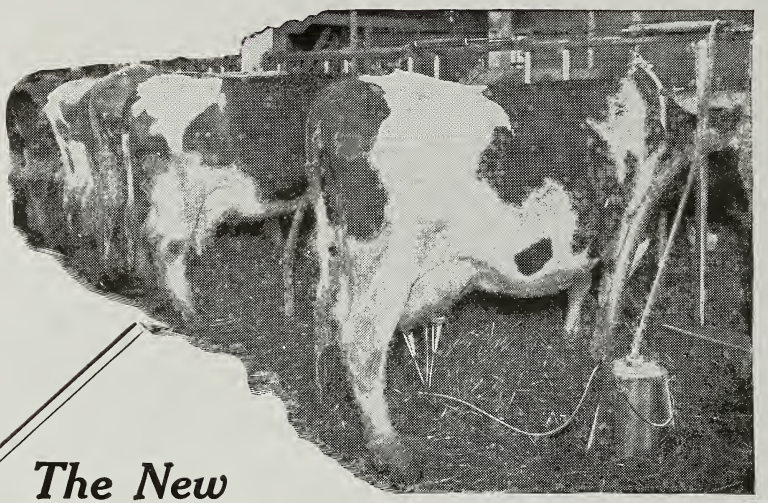

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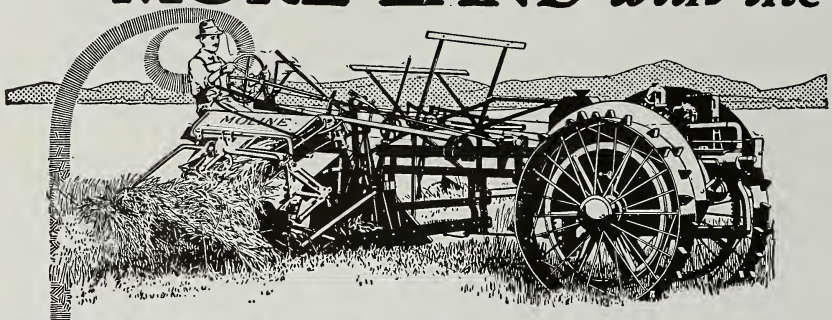

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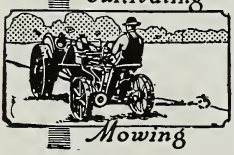
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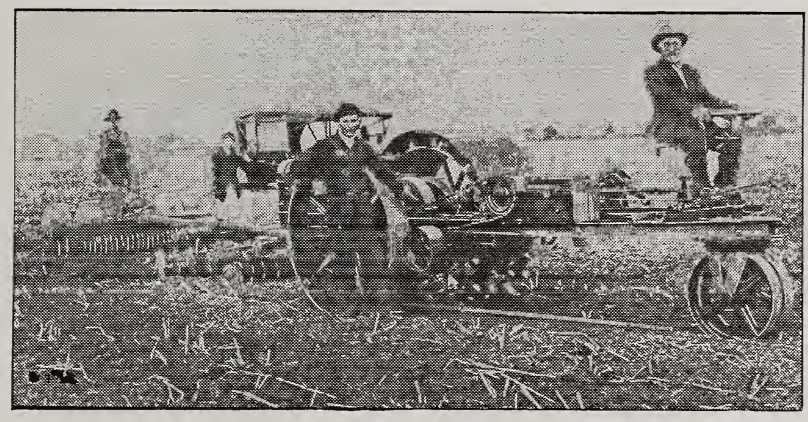
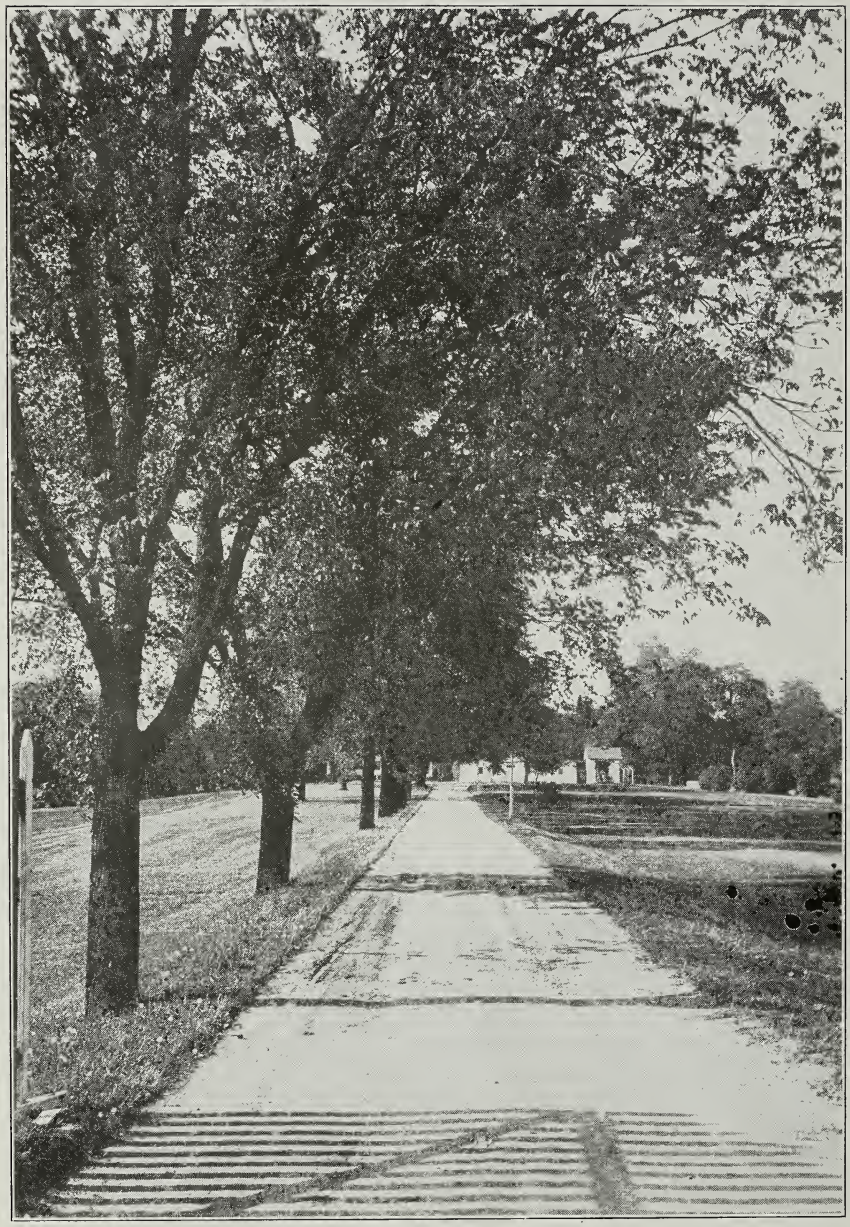


... Contents ...

	Page
SANITATION AND SEWAGE DISPOSAL FOR THE FARM— R. A. Andree	331
GROWING APPLE ORCHARDS TO THE BEARING AGE— W. W. Ellenwood	334
AGRICULTURAL ENGINEERING PROBLEMS IN MICHIGAN— H. H. Musselman	339
WHAT FARMERS SHOULD KNOW ABOUT TILE DRAINAGE— E. R. Jones	344
POULTRY PRODUCTION IN THE UNITED STATES— Freeman S. Jacoby	348
MOTION PICTURES FOR RURAL COMMUNITIES— H. F. Sherwood	350
EDITORIALS	352
HOME ECONOMICS	355
ALUMNI NOTES	358
UTILIZING WATER POWER ON THE FARM— C. H. Sprague	359
SAVE FOOD BY DESTROYING RATS— David E. Lantz	361
CURRENT LITERATURE	364
NEWS NOTES	366
LECTURES TO SHORT COURSE STUDENTS	370



An Attractive Farm Entrance

THE
AGRICULTURAL STUDENT

Vol. XXIV. OHIO STATE UNIVERSITY, COLUMBUS, FEBRUARY, 1918 *No. 6*

SANITATION AND SEWAGE DISPOSAL FOR THE FARM

The Dangers of a Shallow Well; the Work of Bacteria in Destroying Waste and Some Points to Be Considered in the Installation of a Septic Tank for Rural Homes

PROFESSOR R. A. ANDREE, Department of Agricultural Engineering, College Station, Texas

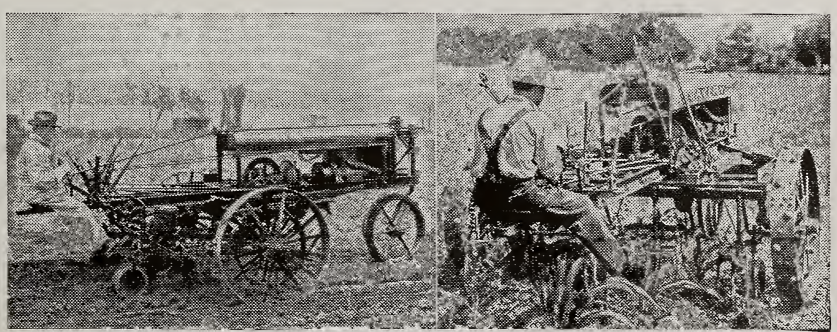
A CESSPOOL would never be installed if the owner realized the full extent of the dangers connected with it. It is true that a cesspool hides the filth only to pollute the ground, the water and the air. Any drinking water appears clear and brilliant and tastes refreshing when it contains carbonic acid gas. Stagnating sewage gives forth this gas, and when well water comes in contact with gas from such a source its sparkling properties may become exceedingly dangerous and are not to be looked upon with pride. It is to be understood ,of course, that carbonic acid gas may come from other sources besides decaying sewage. Many cases are on record where typhoid fever and other diseases have been traced directly to wells that were contaminated by neighboring outhouses. The "Saturday Evening Post" says: "Great cities are developing some sort of a sanitary conscience. Farmers and country districts have as yet little or none." Bad as the city water often is, and defective as the systems of sewage often are, they cannot for a moment compare in deadliness with that most unheavenly pair of twins, the shallow well and the privy vault. A more ingenious combination for the dissemination of typhoid than this precious couple could hardly have been devised. The innocent householder sallies forth, and at an appropriate distance from his cot he digs two holes ,one about 30 feet deep and the other about four. Into the shallower he throws his excreta while upon the surface of the ground he flings abroad his household waste from the back porch. The rain washes these various products down into the soil and it percolates gradually into the deeper hole. When the interesting solution has accumulated to a sufficient depth, it is drawn up by the old oaken bucket, a modern pump, and drunk. **Is it any wonder that in this progressive and highly civilized country 350,000 cases of typhoid occur every year, with a death penalty of 10 per cent?**

In Basil, Switzerland, typhoid fever contamination struck down 17 per cent of the inhabitants of a village that received its water from a spring. The spring was contaminated by a sick peasant over a mile away and on the other side of a mountain. Experiments with salt and investigation proved that this was actually the case. A cesspool and privy vault are dangerous because they do not and cannot purify sewage before it sinks into the ground. To purify the sewage you must burn it with the object of destroying disease producing bacteria. No burning is simply oxidation. You could dry the sewage and it could be burnt because

it would take on the oxygen of the air. But it would not burn if it has no air. An easier way to burn sewage is to oxidize it by means of chemicals. When you put hydrogen peroxide on a wound you burn up the bacteria, chemically, to prevent infection. The disease producing bacteria in sewage can be burned up by chemicals in a similar way and there are preparations on the market for this purpose. They do not need the air in order to get their supply of oxygen, because they contain it themselves. A third way of burning sewage is to do it bacterially. This is no doubt the best way because no chemicals are needed, no labor is involved because the process is automatic and the final product is nothing but water including the soluble salts. Sewage always contains these bacteria naturally so they will never have to be purchased or supplied. These invisible workers eat the sewage and in so doing add oxygen to it which they obtain from the air. These organisms are known as aerobic or air-loving bacteria. If you should take some colonies of these aerobes and deprive them of air they would undergo peculiar changes. First they would encist or form a sort of covering or shroud around themselves. In this dormant stage they would not multiply or feed and oxidize anything but they would simply wait for more favorable conditions. If left without air for too long a period they die from starvation. That is what happened to them in the bottom of a cesspool or privy vault. They are not given a chance and they become useless and die. One rule for the successful purification of sewage by bacterial action would be the presence of sufficient air. It would be difficult to get air to the inside of any solid sewage and for this reason purification of a piece of solid matter is not readily accomplished by bacteria. If the solid matter could be cut up into fine pieces or if it could be liquefied, air could be passed through it more readily. This is exactly what is done in a septic tank. Another class of bacteria known as anaerobes or air-hating bacteria is set to work on the solid matter. You might compare these two classes of bacteria to frogs and fish. A frog cannot live under water long for he must come up to get air, while a fish must get into the water as he cannot live in the air long. The air-hating bacteria eat solid matter and liquefy it. This must be done in the absence of air. The septic tank then, first liquefies the sewage in the absence of the air and then purifies it in the presence of the air. The reader will no doubt already have formed the opinion that if these two directly opposite requirements could be easily accomplished, purification by the septic tank method would be a wonderful boost to the farmer, for his home, for the country schools and grange halls. The septic tank is surely a great scientific contribution and already it is being used extensively in many sections of the country. It happens, however, that both aerobic and anaerobic bacteria refuse to work unless conditions are favorable for their feeding and multiplication. Just as a horse will do a reasonable amount of work when given food and shelter, so these wonderful organisms require food and the proper environment. They will not produce results when overworked and are of no value when idle. It is unfortunate that these bacteria are so particular, but if we wish to utilize them we must meet their requirements. This is the point that has been much misunderstood. "Would be" designers have read a little about septic tanks and have then set about

selling unsuspecting people septic tank "gold bricks." In some instances articles have been printed urging upon the people the construction of a standard tank for which perfect operation was claimed. It is time that such dishonesty be exposed and that the real points be brought out. A septic tank must absolutely be designed to meet prevailing conditions. A tank designed for a family of four is a failure when used by a family of eight. The kind of soil, the slope of the ground, the general conditions of things have so much to do with the design of the tank that probably no two outfits will ever be exactly alike. Not only do conditions alter the size of a tank but they determine the shape and arrangement of its chambers. Inexperienced labor can construct a tank after it has once been designed, but it requires someone with the proper knowledge and experience to design it.

The tank consists of two chambers. The sewage enters the first chamber where it is liquefied under anaerobic conditions. It then passes by a baffle board into a second chamber where it is stored. The second chamber in no way purifies the sewage as is commonly supposed. It simply holds the discolored liquid until the proper amount is stored for aerobic action. From the second chamber is passes thru an automatic syphon into a filter bed or properly constructed tiling system where it comes in contact with the air and is purified. The final product is a safe, colorless liquid. Years ago some single chamber tanks were constructed, but they were failures because they overworked the first few feet of tile to such an extent that purification ceased and the whole system soon clogged up. A properly designed tank gives no trouble, no odor, and seldom needs attention. Some tanks have been operated successfully for ten years without being cleaned and then only a fine black "muck like" material was removed in small amounts. A tank and filter bed complete cost between $60 and $75, while some have been put in for as little as $50. This is indeed a small sum to pay for such a convenience. In many cases it is cheaper than an outhouse in the long run. A septic tank raises your standard of respectability. It does not become offensive but it does deprive the flies and mosquitoes of a breeding place that has always been in great demand by them. It enables you to have a bathroom that is inviting and comforting to the wife and children, and when you have company you will not be ashamed to offer them the sanitary service this convenience affords.



GROWING APPLE ORCHARDS TO THE BEARING AGE

Some Instructions For the Selection, Planting, and Care of Apple Trees

W. W. ELLENWOOD, Coalton, Ohio

OUR first thot naturally is—where are we going to grow this orchard? We must select the best possible location to insure its being productive and profitable. There are several important factors influencing the selection of the orchard site, such as market facilities, topography of the farm and surrounding country, condition of the soil and the value of the land.

Small Fruits May Be Used for Inter-cropping

It should be fairly close to a good railroad and markets with proper cold storage facilities. Good public roads from the farm to the railroad are almost essential, and hard roads to the nearby market towns are highly desirable for we may expect to market at least a part of the fruit by motor truck, perhaps to the retail trade. Surrounding orchards may be either an advantage or disadvantage depending upon whether you expect to market locally or ship to distant cities.

We must have the proper air drainage to protect against frost damage. This is usually provided in an elevation above the surrounding country, a feature commending the hilly sections for orchard locations. Low lands near a large body of water are also favorably protected from the damaging frosts. It is advisable to choose a site level enough for convenience in spraying, mowing, hauling fertilizer and fruit and for occasional cultivation. Where there is a choice of slopes, I would prefer one with a northern or eastern exposure. If it is desired to cultivate the orchard intensively it is better to select a well elevated, nearly level tract as the steep hillsides tend to wash and gully with cultivation.

The soil should be able to retain sufficient moisture without an excess, so land provided with natural drainage is preferable as every tile adds to the cost of the land. I would prefer a fertile soil well supplied with humus for it is cheaper and better to buy the plant food in the soil than elsewhere and then haul it. However if the other conditions are favorable, a rather poor soil may be improved while the orchard is growing.

Ready for the Market—Only a Few Barrels of Culls

We must also consider the value and cost of the land upon which the orchard is to be located, remembering that it is a lifetime proposition and that a good location at a high price may prove a better investment than a poor site at a low cost. Do not plant more intensively than the available time and capital will permit as it it better to have no orchard than one poorly tended.

Selection of Trees.

In selecting the varieties we must consider the market demands and adaptability to the location. The Baldwin, Jonathan, Sutton, Grimes, Rhode Island Greening, Delicious and Gano are standard market varieties suitable for northern Ohio while the Rome Beauty, Grimes, Jonathan, Delicious, Stayman, Winesap and one of the Ben Davis class are more suitable for the southern part. The Yellow Transparent, Dutchess of Oldenburg and Wealthy are summer and fall market apples, ripening in the order given, suitable for both northern and southern Ohio. If the location is near a market we might add some of the other dessert and cooking apples for the local trade.

I would prefer sound, thrifty yearling trees. These can be transplanted at less expense and with greater assurance of growth as their root systems are not so seriously disturbed in the removal as those of the older trees. With the yearling trees we have the advantage of being able to head and select the scaffold limbs where desired, while the older trees are often headed too high when received from the nursery. It is advisable to order from a

good local nurseryman, one who has a reputation for honest dealing, and clean healthy trees that bear fruit true to their name. It is well to order early to assure prompt delivery for the planting date.

The soil should be in the best possible condition to receive the trees. All sections in need of drainage should be tiled, for fruit trees cannot thrive with "wet feet." A clean, thoro, deep cultivation should precede the setting of the orchard.

Method of Planting.

Fall or spring, as conditions or convenience in time and labor dictate, may be chosen as the time for setting the fruit trees. I prefer the early spring, having them in the ground ready to start with the spring rains as they will be better able to withstand the summer drouth.

The square system of planting is most commonly used in commercial orchards of Ohio. It permits convenience in tillage and general orchard management. The spacing of the trees will be determined by their spreading characteristics and the fertility of the soil. Mature trees on fertile soil will often crowd when 50 feet apart, while on lighter hill soils 30 feet is room enough. Growing peaches as fillers in the apple orchard is to be condemned as it interferes with the proper care of the trees. If fillers are desired, the summer and fall apples mentioned above may be planted in the center of the squares. Their tendency is toward an upright growth and to bear fruit when quite young. There is one great trouble with this system of planting. These trees are usually so profitable that the owner hesitates to cut them out at the right time, when they begin to crowd the permanents. Small fruits might be used to a certain extent for inter-cropping to help offset the expense of the orchard if there is a nearby market for them.

In placing the trees we must bear in mind the arrangement to insure pollination. Planting two rows of one variety, then two rows of another is usually a safe method. Care should be taken to place the trees so that they will line up correctly. The orchard may be laid off with the aid of a surveyor's compass and chain, or a wire may be stretched across the field as a guide in locating the stakes. The planting board may be used to insure accurate alignment of trees when placing them in holes.

The holes should be ready to receive the trees before their arrival from the nursery, and should be large enough to admit the tree without cramping the root system. Dynamite has proven very successful in blowing holes for trees and especially beneficial in the tougher soils or where underlaid with hardpan. The holes should be about 24 inches square and 18 inches deep, and filled with the fertile top soil to allow the tree to be set about 2 inches lower than in the nursery. Do not allow coarse manure or sods in the bottom of the holes or around the roots for they absorb the moisture and are sure to delay the growth or prove fatal to the tree.

When the trees are received from the nursery they should be heeled in, unless set at once. When a large number are to be planted they should be "heeled in" until ready to be set. Heeling in consists in burying the roots in a trench and covering with dirt to prevent drying out, their tops sloping to the south. If the trees are received from the nursery in the fall for spring planting they must be especially cared for in this respect.

Care must be taken to prevent the drying out of the roots while the young trees are in transit to the orchard, and during the setting operation. All broken and ragged ends of the roots should be pruned off clean and thinned out where too thick. Each tree should be closely inspected for disease and insect pests, as crown gall, hairy root, aphis and scale. Incline the tree slightly toward the prevailing wind, put in a few shovels of top soil and tramp it firmly to prevent any air spaces around the roots. Fill the hole, tramping occasionally to firm the soil, but leave the top soil loose to form a mulch. If any fertilizer is to be used, do not place it in contact with the roots as injury may result but rather scatter it on top. Nothing is better for this purpose than a mulch of stable manure. Since part of the roots are lost in taking the tree from the nursery, the top must be pruned to correspond with the root system. As the yearling apple trees are unbranched, the top pruning will consist in cutting back the whip a certain distance to permit the proper heading of the tree. The wire labels should be removed from the trees to prevent girdling. A record should be kept of the location of every variety.

Care After Planting.

While too much stress cannot be placed on the foundation of the orchard, we must care for it just as diligently after planting. The pruning, cultivation, fertilization, mulching and sanitary measures must be thoroly attended at the proper time.

Pruning the young trees will consist largely in training them to the proper form. We should picture in our minds an ideal tree and then train the young tree to correspond with this ideal. It should be low enough to permit convenience in pruning, spraying, thinning and picking the fruit. The top should be kept open to admit sufficient light to insure correct coloring of the fruit. The three to five scaffold limbs should be selected as early as possible and encouraged. They should be distributed evenly around the tree and should not originate too close together on the trunk. Each tree must be treated in respect to its own peculiarities of growth. Care should be taken to keep

Well-Built Roads Are Desirable for Marketing Fruits

the tree balanced and cuts made close to the bud or branch to avoid leaving stubs. Avoid forks, cross limbs or branches, water sprouts and all unnecessary pruning. The beginner can be too zealous in forming his ideal and injure the tree by severe cutting. Do not forget that the leaves are the lungs and digestive system of the tree and that severe pruning reduces its capacity for growth. Pruning may be done almost any time of the year but late winter or early spring is a favorable time.

Cultivation of Orchard.

The young orchard should be cultivated for a few years at least but in hilly districts this may not be advisable. Here the tree rows may be cultivated or the trees hoed, and the orchard kept in a sod, the sod mulch system being used later on. If straw or manure cannot be secured for this purpose, the mulch may be grown in the orchard with the aid of commercial fertilizers and lime. In the level orchards either the sod mulch or cultivation and cover crop method may be used successfully. Such crops as clover, soy beans, cowpeas, rye and sweet clover are recommended. Where cultivation is used, the cover crop must be sown and tillage cease in time for the wood to ripen before winter begins.

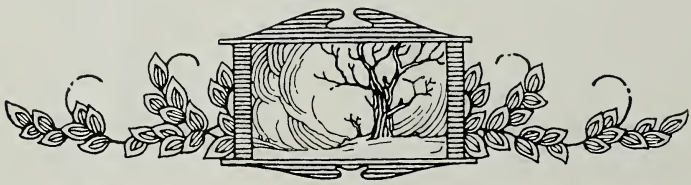
On poorer soils where manure is not available, enough fertilizer should be applied to keep the tree growing, increasing the amount as the tree increases in size. The kinds and amount to be used must be determined by the soil condition and management. Do not try to produce an abnormal growth as the tree is likely to be winter injured.

While the young orchard does not require as frequent spraying as a bearing one, yet it must not be neglected. Such insects as aphids, borers, San Jose scale and web worms will require special attention and remedies. Keep the orchard just as free as possible from trash, filth and brush piles and guard against the ravages of rabbits and mice.

Strive to create a reputation for growing highest quality fruit and be able to market to advantage even in years of abundant crops as "He who writes a better book, preaches a better sermon, or makes a better mouse-trap than his opponent, will find a beaten path to his door, even tho he live in a wilderness."

Whether the orchard will be a success or a failure depends largely upon the interest and ability of its caretaker. He must be willing to toil faithfully "Without halting, without rest, lifting better up to best" and to wait patiently for his labors to bear fruit. He must keep abreast of the times and awake to the newer things in horticulture for,

"I doubt not thru the ages our increasing purpose runs,
And the thoughts are widen'd with the process of the suns."



AGRICULTURAL ENGINEERING PROBLEMS IN MICHIGAN

Work That Must Be Done Before Our Sister State Can Be Fully Utilized

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THE layman from the hazy recollections of his youthful acquaintance with geography is inclined to regard Michigan as a state of sand wastes in which the lumbering industry stands out above everything else and in which the Upper Peninsula is a mass of ice and rock. These impressions were undoubtedly correct for that period but vast changes and improvements have come over the state since that time. Timber is becoming scarce and the cut-over lands, long neglected as worthless, are being rapidly developed into excellent dairy sections, and the great Upper Peninsula has been found admirably adapted to the growth of legumes, vegetables, some fruit and grasses. It is being stocked with sheep, beef and dairy stock at an amazing rate. The agricultural possibilities are considered so great that no less an authority than the Dean of Agriculture of the Michigan Agricultural College has called it a vast undeveloped empire.

Michigan is unique in her location, industries, soil, production and people. Stretching, as she does, 500 miles from southeast to northwest, a wide variety of climate is found. Soil types are so varying that often several kinds of soil may be found on one farm. The Great Lakes surround her on every side and her beautiful inland lakes have made her a veritable summer resort for people of the Central West. Her productions range from peppermint to copper. From an agricultural standpoint she has no outstanding production of any one crop but her variety is so great that she could exist as an isolated empire while her people could enjoy the reasonable comforts and luxuries of life, with the exception of cotton, which is not produced in the state. She ranks high among the other states in the production of beans, peas, potatoes, rye, buckwheat, sugar, beets, oats, grass seeds, vegetable seeds and mint.

The other industries of Michigan are as interesting as her agriculture and embrace manufacturing, lumbering, mining and the marine industries including water shipping, fishing and shipbuilding. In manufacture Michigan is known for her furniture, automobiles and cement. In lumbering she still leads in the production of beech and maple. She stands third in copper production and second in iron ore, besides coal, salt, gypsum, and other products.

But the purpose of this paper was to discuss the agricultural engineering possibilities of Michigan. Naturally, in a state which is developing as rapidly from a physical standpoint there are numerous problems of this kind. One of the unique engineering problems in Michigan is that of reclaiming the marl, enormous deposits of which underlie her marshes and lakes. Marl has about the same composition as limestone and is used for the same purpose agriculturally as ground limestone. For cement manufacture it is handled with huge dipper dredges, but since much of it is in small deposits beneath the surface of the water it cannot be handled by similar methods by the farmer, and, in fact, it is quite impossible to reach it by any means which the farmer has at his command. Efforts

have been made to develop pumping and small dredging apparatus which will handle it but without success.

The problem of stumping is also an important one and stumping in this state means the removal of the huge pine stumps from the timber, some of which was cut thirty years ago. And these stumps unless removed might still be sound thirty years hence. Millions of acres remain yet to be stumped. It has become a real engineering problem, and various types of capstan, lever and screw pullers have been devised. Stump pilers are also in use for piling the stumps so that they may be made to burn as small piles of these stumps do not burn readily.

The drainage problem in the state has received little attention. Along the eastern side of the state is a steep, 50 miles wide, of level clayey soil which needs careful and adequate drainage. For three years the crops in this section have been flooded out and the necessity is being forcibly brought to the attention of the farmer. Besides this there are immense tracts of low-lying, flat marsh land to be reclaimed by drainage. Thousands of acres of this land have been reclaimed and turned to the production of mint. There is a novel farm of this nature near Saginaw consisting of 10,000 acres which has a dike around the entire area, and from which the water is pumped as a means of drainage.

The building problem is also an enormous one in Michigan. The whole Upper Peninsula which is just coming into its own agriculturally is to have built within the next decade thousands of farm homes. The planning and designing of modern buldings for these farms is a task which any man might be envied.

A Modern Farm Home in Northern Michigan

Besides the great problems which have been briefly discussed there are the problems of the better use of machinery to be taught, especially to the Upper Peninsula people. The state is also alive to the water supply and sewage disposal problem. As indicative of this it may be said that the extension specialist from the college has supervised the installation of 100 septic tanks as demonstration projects in different communities. The Michigan farmer, though conservative, is selecting carefully and wisely as his means permit.

WHAT FARMERS SHOULD KNOW ABOUT TILE DRAINAGE

Advantages and Methods of Installing Drainage Systems Everywhere

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DIG a post-hole three feet deep in a field whose surface appears to be dry or dusty. Water may trickle out of the soil into this hole. When trickling has ceased, the top of the water in the post-hole indicates the water table in the soil—the plane below which it is saturated with water to the exclusion of air.

Slight Elevations Are Ideal Sites for Farm Homes

Plant roots do not choose to penetrate below the water table. They would not if they could and they could not if they would. A water table six inches below the top of the ground during April means a root system only six inches deep and when the water table sinks four or five feet during July the roots are hung high and dry and suffer for water. Give them underdrainage three feet during April and the roots of oats and corn will spread their network thru three feet of fertile soil from which they can draw capillary water during a dry July.

I am reminded of the German people, the Kaiser and his lieutenants. The intriguing Prussian military clique has been feeding the common people of Germany with a spoon until they depend upon the spoon. The spoon was a sword in disguise but it served the purpose. It gave the German people shallow roots in the soil of self-government — roots no deeper than those of the snake in the grass, roots that have never reached the sweet depths of democracy for which our forefathers fought and which they won. And when the German Kaiser was caught red-handed trying to spread his

shallow-rooted intriguing autocracy over all the world it became the business of self-respecting, self-governed, and deep-rooted people to stop him. When he gets his final knockout our Kaiser-fed German cousins will develop their own government with its roots penetrating to natural depths and their lives and prosperity will be the healthier for it.

Any farmer who handicaps the root development of his crops by poor underdrainage is out-Kaisering the Kaiser, with this exception: The Kaiser stunts his subjects to serve his selfish purposes while the farmer stunts his crops because of negligence.

A wet soil is a cold, sour soil. Drain it to a depth of three feet and sweet warm air circulates thru it. It develops favorable bacterial action in the soil and keeps away the killing frosts.

While drainage improves the public health, we drain for profit. When we spend $100 for drainage we expect more than $100 in return. It comes back by way of increased crops and increased market value of the land. I have recently received letters from 75 Wisconsin farmers who have spent from $100 to $3,000 in farm drainage systems. Only two were dissatisfied and they blamed themselves for foolish mistakes they made in planning the drainage system. The other 73 reported a net profit of from 20 to 100 per cent each year. One man spent $1,000 draining 40 acres that had never grown anything but willow brush. The first year he raised enough buckwheat there to pay for clearing and breaking and the second year he harvested 75 bushels of corn per acre. Land that was worth nothing for production but which we will be charitable enough to assume was worth $10 an acre, was made to

Drainage Water Can Sometimes Be Used for Power

sell for $150. But more profitable still was the venture of the man who harvested only 73 bushels of oats from 40 acres that he plowed, harrowed and seeded in 1914. During 1915 he spent $1,200 draining the 40, and in 1916 he harvested 1228 bushels of oats from half of it, and cut four tons per acre of timothy and alsike hay from the remainder.

The most unprofitable land we have is that which is just dry enough to tempt you to plow it but just wet enough that you lose your crop and waste your seed and labor. If it were not so dry it would be better because then one would know enough to leave it alone. Drain first the wet spots in your cultivated fields. It is easier to cultivate them when dry than to dodge them or wallow thru them when wet.

One way to lower the water table three feet is to have open ditches about four feet deep. On tight soils they would have to be eight or ten rods apart because the water table curves upward and comes nearer the surface the farther you go from a drain. Some people think that open ditches are the cheapest and hence the best means of under drainage, but they occupy too much land, they have to be bridged and fenced and they make cultivation awkward. An open ditch does not keep its shape or depth any longer than the German Kaiser can keep his word, and the Kaiser's word isn't worth his breath, and his bond isn't worth the paper on which it is written. We want treaties that are something more than scraps of paper and we want drains that stay where we put them.

To stay three feet deep a ditch must be seven feet wide at the top. It is cheaper and better to dig a trench one foot wide and three feet deep and to bury a pipe in it. Have the pipe in pieces a foot long and leave a crack one-eighth inch wide at the joint thru which water can enter. Give the pipe a fall of an inch in 100 feet to a free outlet and the water can get away.

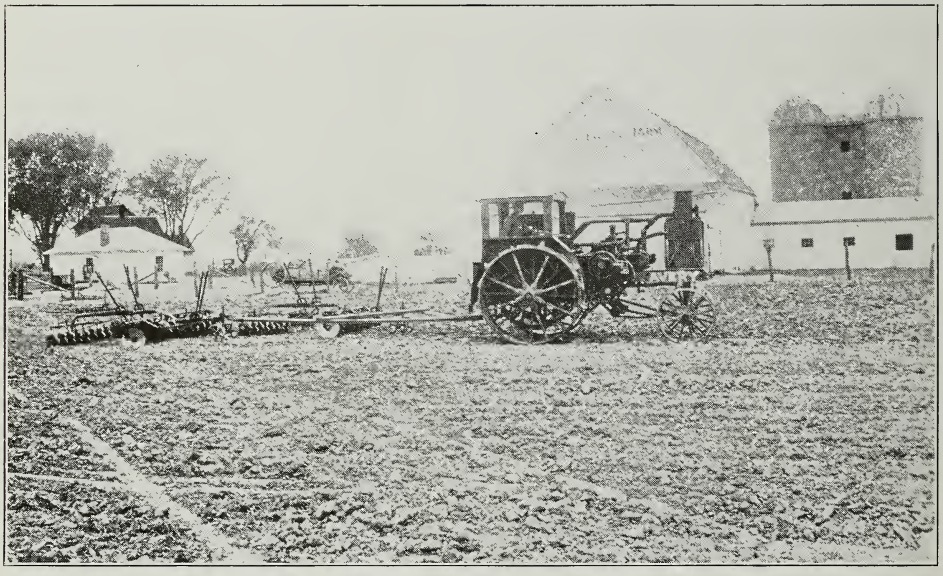
Pioneer days had substitutes for drain tile—stones, poles and boards were buried in trenches and some of them are working today but at the present cost of labor we cannot afford to expend it on inferior material.

Nine-tenths of the tile now in use are made of burnt clay. This general use is largely due to the common occurrence of clay adapted to tile manufacturing. The porosity of clay tile is not an advantage because most of the water enters thru the crack between the tiles. The high water content of the walls is a distinct disadvantage where tile are subjected to sudden freezing and thawing many times during the winter. The sudden expansion and contraction of the water held in the walls may cause the tile to crumble in a single winter. Protected with ample covering and properly laid drain tiles freeze but once during the winter and this does not hurt them. If the outlet is so obstructed that they freeze full of water, any tile will burst. With reasonable care good clay tile are admirably adapted to general farm use. Many clay tile laid 60 years ago and frozen every winter are still in perfect condition.

Shale tile resembles clay tile but have a more glassy face and are also less porous and harder. They are made of ground shale rock being mixed into a plastic condition. This extra labor and the scarcity of shale makes them somewhat more expensive than clay tile. Five-inch shale tile may cost $26 a thousand feet where clay tile of that size may be bought for $25 a thousand. The walls of shale tile contain so little

water that they are not injured by repeated sudden freezing and thawing. If the tile are to be subjected to unusual abuse the slight extra cost of shale tile is a wise insurance against possible loss.

Vitrified tile are harder and more glassy than even shale tile. They are used commonly for sewers. Their only disadvantage is that they cost about twice as much as clay tile of the same size. This extra expense is not justified



Proper Equipment Helps Solve the Labor Problems

except where the tile must stand an unusual strain. In a cut more than ten feet deep they are advisable because the weaker clay or shale tile may be crushed by the weight of the overlying soil. Where the fall is more than one foot in 100 feet in a main line, water flows with such a force that it may wash ordinary tile out of place while vitrified tile stay in place. The collar or bell on the larger vitrified tile make it possible to cement them together. This stiffens the line so that it endures the violence of the rushing water. Two or three lengths of vitrified tile cemented together are desirable at the outlet of every main line of tile. Such an outlet bears undermining and exposure without injury.

Good cement tile have stood the test well. Poor cement tile have fallen down in less than two years. The causes are poor cement or sand, a lean or uneven mixture, and improper curing. In localities eight or ten miles from a freight station, farmers are tempted to make cement tile on the farm. This is hardly ever advisable. Those interested in the proper use of cements maintain that justice can be done to cement only where the tile are made in large factories representing an investment of $40,000 or more. While there is a justified tendency on the part of farmers to continue using clay tile because their durability has been proven it must be remembered that good cement tile are better than poor clay tile.

Examine the fractured surface of a broken cement tile. If the sand grains

themselves have actually broken, it indicates strength and good quality. If the sand grains have merely split from the cement it indicates inferiority. Cement tile that are soft enough to let water pass thru their walls are to be avoided.

A line of tile is no better than its poorest one. The tiler is in position to cull out the poorer ones and to lay only the good ones. Nevertheless the shipment as a whole should be examined before the tile are taken from the freight yard. Reject the entire lot if 5 per cent appear to have been below standard upon leaving the factory. Excessive breakage due apparently to inferior quality is also cause for wholesale rejection. If the breakage is due to rough handling, accept the unbroken tile but reject the broken ones. Let the shipper settle with the railroad company, but notify the railroad agent of the breakage at once.

Clay tile whose weight can be increased more than 14 per cent by absorbed water are too porous. Twelve per cent is the maximum limit of absorption permissible for cement tile. The less the absorption capacity the better the tile endure repeated freezing.

Tile that cannot bear the weight of 800 pounds per linear foot without crushing are below established standards. A 4-inch tile requires this strength as an indication of quality. The larger tile require strength because of the weight of earth that they must actually bear as a 16-inch tile under 10 feet of wet clay must bear a weight of about 2,000 pounds per linear foot.

Tile that are cracked may be detected by a dead sound when struck with a light hammer. Somewhat objectionable, but more permissible are tile with notched ends. Where these notches are more than one-fourth inch deep, patches or bats made of pieces of broken tile are necessary. Tile of good material but patched or warped are less objectionable in a clay or a peat soil than in sand.

The danger of freezing is a blessing in disguise. Two-thirds of the tile laid in Wisconsin freeze every winter. We have to keep the outlets open so that the backwater does not freeze and burst the tile. We re-enforce our outlets with concrete walls or cemented sewer pipe. We must avoid sags in the grade line because they would trap water that would burst the tile upon freezing. We place our tile at least two and one-half feet deep in clay and from four to five feet deep in peat to prevent heaving. We are forced to take these precautions to cope with the frost. Were it not for the frost we would be tempted to tile carelessly and too shallow to effect good drainage.

For twenty years we have been getting good 5-inch clay tile for $25 a thousand feet f. o. b. at the nearest freight station. Today they cost about $35 or 3½ cents a foot or about 60 cents a rod. With fair digging an experienced tiler can finish 15 rods a day three feet deep. In such work 50 cents a rod gives him good pay. Greater depths or sizes or harder digging entitles him to more pay for each rod. He should have about $1.75 per rod for digging the trench and laying a 12-inch tile four feet deep in sticky clay. The farmer fills the trench at a small cost with a team and plow.

Many 4-inch tile are used, but 5-inch tile are a better investment even for laterals. The cost of 5-inch tile for tile and labor is about $1.25 per rod for average conditions. Four-inch tile cost about $1.15 per rod, because the cost for labor is the same for each. The 5-inch are worth more than 10

cents a rod more than the 4-inch anywhere and for lines more than 500 feet long 4-inch tile are wholly inadequate, especially in sandy or peaty soils.

Tight soils require laterals four rods apart to insure cultivated crops in wet years. This means $50 an acre with the present high prices. Thirty-five dollars did the same work a year ago.

The size of the main tile depends on the size of the area. An 8-inch main falling an inch each 100 feet is usually sufficient for 20 acres of clay. A 10-inch tile is sufficient for 40 acres. Springy lands require larger mains.

above the proposed grade line. At intervals of about 100 feet between the two end cross-bars nail intermediate bars by sighting over the two end ones. If the slope of the land is uniform each bar will be about two feet above the ground. It may be more or less depending on whether or not there are any humps or sags on the surface of the ground. The grade line will be straight and parallel to the line of height and just five feet below it. The tiler digs until by sighting over the top of a five-foot stick he finds it in line with the tops of the cross-bars. If

Showing the Construction of a Silo

A system in which each lateral has an independent outlet into an open ditch is to be avoided. It is better to have the small lines discharge into a large one which has a single outlet into the ditch.

There is a method of getting a true grade line so simple that it does not pay to get along without it. Suppose that a carpenter's level carefully used shows a fall of one foot in 500 on a proposed line. Drive a hub flush with the ground at each end of the line. Choosing a depth of three feet at each end, nail a cross bar two feet above each hub. Then it will be five feet

there is water in the trenches he does not need to test the grade line only once in about 10 feet, but where the trench is dry it must be tested every two or three feet. Where grade bars are not used on level ground, it is a common mistake to waste so much of the fall near the outlet that the tile are too shallow at the head. This mistake is most serious on mains upon which many laterals depend for an outlet.

Another mistake is that of having no definite plan for a drainage system. Lines put in promiscuously without being a part of a general system are apt to be misfits. The plan may be a sim-

ple one—the simpler the better—but it should not include anything that will have to be undone when the system is complete.

No man can afford not to use a level in laying out a drainage system. Even though he is sure there is two feet of fall across a 40-acre tract with a ditch four feet deep along one side of it. Let him prove it by setting up a carpenter's level on a fence post near the center of the line and sighting both ways. If he finds less than a two-foot fall in that distance, let him put the carpenter's level on the shelf and get an engineer with a surveyor's instrument to finish the job.

The preliminary survey consists of taking levels on the critical points on an area so that the system can be planned in a general way. This serves as a basis for estimating the number of tiles of the different sizes that are needed. The depths necessary can be estimated approximately also, so that a tiler can submit an intelligent bid on the labor. When the tile have been delivered and the work is about to begin, is ample time for the final survey. Lines are staked out and hubs are set, preferably every hundred feet on each line and depths are computed from the elevations of these hubs.

Some tilers are good engineers. They can use a surveyor's level, measure accurately and compute depths. Others do no surveying at all and will work only when an engineer has staked out the lines and furnished specifications for depths. These are frequently the best tilers. The tiler who can do no surveying for himself and who refuses to carry out the specifications of an engineer is to be avoided.

It is for the farmer to decide whether he is to do his own leveling, to get a tiler who can do it, or to get an engineer to stake lines and establish grades for the tiler. In any case, responsibility must be placed upon someone. Twenty-five dollars paid to an engineer for laying out and superintending the laying of a carload of tile is a good investment. It is better to be safe than sorry. The water in the trench may be used as a guide for getting the grade under favorable conditions. But in dry weather there may be no water in the trench and in quick sand the trench will not remain open long enough to permit the use of the water surface as a guide. The sighting method, or a similar one, must be used in these cases.

In communities where there are no experienced tilers it is a good plan to put the work in charge of a young man who can handle men and who is willing to follow the specifications of the engineers. If the young man is ambitious, and gets practice in using a surveyor's instrument, he soon becomes a good practical drainage engineer and his pay is good.

Where the work is done on a small scale farm hands can be used when other work is not pressing. There the farmer himself acts as foreman and a little study and intelligent effort makes a fair engineer out of him. On every job there must be someone who is responsible for the accuracy of the work. Where everyone is responsible, nobody is responsible and poor work results.

Buy tile in carload lots. If you do not need a whole carload—about a mile of 5-inch tile—combine your order with that of your neighbor so that you can get carload rates. While you are at it don't forget to go halves with a neighbor in putting a line of tile that will be of equal benefit to each of you.

POULTRY PRODUCTION IN THE UNITED STATES

Importance of Early Hatching in Egg and Meat Production Emphasized

FREEMAN S. JACOBY, Department of Animal Ausbandry, Ohio State University

RECENTLY the United States Department of Agriculture and the Food Administrator asked the farmers of America to produce a large poultry crop in order that the people at home might eat chicken instead of beef or pork, which is needed as a staple food for the soldiers at home and abroad. The farmers have always been patriotic and would like to heed this appeal but February, 1918, finds them in a peculiar predicament. Since August, 1916, there has been almost a continuous procession of poultry, live and dressed, to the eastern markets. The high prices of feed started the procession, and the high prices paid for the fowls have kept it moving. In many sections of the country the farms are almost devoid of chickens. Naturally the question presents itself: how are the farmers to meet this demand for increased production with the handicap of a decreased working unit at the outset?

There is need, not only of a large production of poultry but a corresponding production of eggs. Eggs constitute the healthiest form of meat for the growing boy or girl. They should have at least one egg a day from April until September first, and one egg every other day the balance of the year. It is hardly necessary to state that probably during the past year less than one-tenth of the children in the country have consumed the 260 eggs to which they are the rightfully entitled. Their chances during 1918 will certainly be less than in 1917 unless the hens that remain upon the farms are made more productive than the average hens of the past.

One of the first steps the farmer can take towards this desired production is the hatching of next winter's layers and roasters. The hatching should start as early in the spring as practical and extend until June 1. This necessitates the use of incubators and brooders. Hens will not become broody in sufficient numbers during March and early April. The incubator is the only means of assuring a supply of early hatched chicks. Experiments have proven repeatedly that early hatched chicks make a quicker and more economical growth than those hatched later in the season. Furthermore they reach maturity in the fall of the year and commence to lay at a time when eggs are highest in price. The late hatched chick not only develops slowly but when mature, does not seem to possess that abundant vitality that characterizes the pullet that made its growth during the spring months. It may be due to the quality of the eggs early in the season, or it may be due to the invigorating atmosphere. Whatever the cause, the fact remains that the best pullets are early hatched. A pullet well matured and healthy possesses only a low resistance to disease. In the case of the half grown pullet, the resistance is still less, so that it is not entirely unexpected when an epidemic of disease sweeps thru a flock of this character. Thus the month or two added to the life of the chick represents not only increased production but freedom from disease as well.

Early hatching of the cockerels has the same beneficial effect upon growth

as in the case of the pullets. There is a larger development of bone with a corresponding increase in muscular tissue in the early hatched cockerels that is not possible to attain with the late hatched ones. The fancier has appreciated this fact, and has endeavored to hatch his breeding stock as early in the season as possible. How can the farmer utilize to the full extent this vitality that is possessed by these vigorous cockerels? The answer is—by caponizing. Every cockerel that is not needed for breeding purposes and that weighs from one to two pounds by the first of June should be caponized. These capons will make a steady and profitable growth until January and can then be marketed as eight pound roasting chickens instead of six pound stewing chickens, and at a price that makes their production profitable. With the present prices of feed stuffs, the late-hatched, slow-growing cockerel never can be a profitable side issue on the farm. Better by far to sell them as broilers, for the cost per pound of gain after the broiler age is such as to render them decidedly unprofitable. Thus we see that the early spring growth, while it may seem expensive at the time, is in reality the cheapest growth, for its good effects extend thruout the life of the individual and bear fruit in the form of increased growth and egg production. The farmer in 1918 that is able to make his poultry flock pay a handsome profit is the farmer who early in March fills his incubator with eggs, without waiting for the hens to become broody.

Students Building a Poultry House

MOTION PICTURES FOR RURAL COMMUNITIES

Plan That Is Being Developed in North Carolina Quite Successfully

H. F. SHERWOOD, National Board of Review, New York City

ONE of the needs of rural communities is a form of entertainment which will bring closer the life of the world. The motion picture offers the best solution of this problem. Unfortunately the difficulty of obtaining suitable films, the cost of the equipment and of exhibiting the films, and the legal requirements regarding fire-proof booths and licensed operators have made it almost impossible heretofore to maintain regular motion picture entertainments in the country neighborhoods.

The state of North Carolina has taken the bull by the horns. At the last legislative session an appropriation of $25,000 was made to assist rural communities in arranging for motion picture entertainments. The State Superintendent of Public Instruction was directed to provide for such entertainments where communities desired them. The plan for putting this act into operation has been worked out and a circuit has been organized in Sampson County. Under this plan the motion picture service is combined with the community organization work done by the State Bureau of Community Service. The act provides for a series of entertainments varying in number and cost, two-thirds of the cost being paid by the communities served and one-third by the State. A unit consisting of one complete picture outfit, photoplays and operator and everything necessary for one year's service costs about $3,000. The county's share is $2,000, the state providing the balance. The plan involves the organization of a circuit of ten community centers, each guaranteeing its proportionate part of the cost to the county Board of Education. The entertainments are held twice a month. The type of man chosen for operator is one who can organize community leagues in the different communities. Each program consists of not less than six reels, occupying about one and one-half hours. The remaining half-hour of the meeting is made available for holding a community meeting and discussing community problems. At this meeting may appear some state official interested in community development work, such as farm demonstrations, and present the subject in which he is interested. Other officials accompanying the operator in his rounds may be the County School Superintendent or the Health Officer.

Ten communities in Sampson County asked for the service for a full year beginning November 20. Each of these communities guaranteed to the Sampson County Board of Education a sum not to exceed $225.00 to pay for the service, each being allowed the privilege of choosing its method of raising the money. In every case the communities decided to charge an admission fee of ten cents. This is proving a decided financial success. Some of the communities have taken in at a single meeting more than three times as much as the cost of the service. The program included two health reels on tuberculosis furnished by the State Board of Health. The county health officer made the rounds with the operator, talking a few minutes at each meeting on the subject of tuberculosis and Red Cross seals in connection with the films.

"But, after all," says W. C. Crosby,

who is organizing the work, "the finest thing, perhaps, in the whole big idea is the wholesome and regular recreation for the whole community furnished thru these pictures, and the fine community spirit that grows out of the meetings."

This plan can be carried out without the assistance of state funds. A group of Granges in a given region can appoint committees to take charge of such entertainments and arrange their halls for the exhibition of pictures. Thru cooperation they can establish a circuit and procure a program of pictures for circulation in the region for a given period of time. A licensed operator can be hired by the week by the cooperating societies. He will carry the films from place to place in order of exhibition. The rental of films by the week is less than by the day, and makes it easier at the same time to secure what is wanted. Portable machines can now be purchased at a reasonable price. They can be run by electric power, small motors or a belt from an automobile, as well as by gas tanks. The cost of the machine which ranges from $150 to $300 can be apportioned over a period of two or three years. The National Board of Review of Motion Pictures, 70 Fifth Avenue, New York City, publishes lists of films reviewed by its committees and declared by them to be especially suitable for family entertainments. These lists may be had an application. In North Carolina the circuit is covered by means of an automobile which carries about a motion picture machine and an electric light plant. Insurance regulations are met thru the use of an incandescent lamp. This type of lamp also solves the question of licensed operators. The average cost of the performance has been found to be about $12.00.

Interior of Dairy Barn, State Prison Farm, London, Ohio

OF

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COLUMBUS, OHIO, FEBRUARY, 1918.

EDITORIAL

CARE OF FARM MACHINERY.

WHILE traveling along the public road one day this winter just after a heavy rain that had frozen on the ground making a cover of ice for all out-of-doors, we noticed the following machinery setting out in a barn lot: wagon, rake, tedder, mower, roller, spring tooth harrow and manure spreader. These were all uncovered and entirely exposed to the weather and yet they stood in the shadow of a large, unoccupied barn.

This farmer is considered one of the best in his community; he raises good crops, he has good stock, he drains and improves his land, his children are sent to the best schools, and he is a prosperous citizen, but he has failed to see the loss that he must sustain and the carelessness that others observe.

This is the kind of farmer that complains of the high cost of farm machinery. No wonder that his machines soon wear out, no wonder that they must be repaired every year, no wonder that they get out of adjustment and fail to give satisfaction. As long as the owners fail to take proper care of machinery, that long will it continue to be an unnecessary expense.

BOOKS IN THE FARM HOME.

THE child who does not love to read is to be pitied because one of the greatest pleasures and means of gaining information is not his. Equally as misfortunate are the boys and girls who love to read and naturally will read but because the proper material is not placed within their reach, waste their time and energy by filling their minds

with the nonsense found in worthless reading matter. A farmer would never permit his colts or young cattle to feed upon spoiled or inferior feed which might injure them in later life but would supply only those products which enable them to develop most perfectly. If those materials are not at hand he does not hesitate to go down into his pocket for whatever sum is necessary to supply the need, but if it is a book or magazine for his boy or girl that is desired he is too often negligent about supplying it. Young folks are often censured for the reading material when they have without a doubt chosen the most interesting which is available. Boys and girls on the farm should be encouraged to read and the best way to do this is to place a good number of the best books before them. When filling the mow, the granary or the corn crib with food for the cattle, horses and hogs, why not fill one shelf of the bookcase with material which will impart to the boys and girls information, pleasure, and an appreciation and desire for good books?

FARM TRACTORS.

THE harvest of 1918 should be larger than the harvest of 1917 if the people are to be fed and comfortably housed, notwithstanding the fact that thousands of farm laborers are now in the army where they must be fed from the fields that they cultivated last summer. The greatest problem confronting the American farmer today is the securing of sufficient help.

The use of tractors is one of the best ways of solving this problem. No one can expect the tractor to take the place of the men who have gone from the fields to the camps but they will fill the gap better than anything yet devised. The man who can plow seven acres per day with his tractor will be more liable to plant his crops at the proper time than the one who can plow only two acres with the team. Working the ground two or three times at one operation is far more efficient than driving the teams over plowed ground as many times, and one man is doing the work that would require two if done by teams.

The tractor has not come to that stage of development where it can replace all of the horses nor is it practical for the man on a small farm who has no outside work to do, but it has taken its place as one of the valued implements on the average American farm. Every farmer cannot be advised to buy a tractor but each one should carefully weigh the case and determine whether or not it would be a good investment for him to make.

THE WAVE OF PROHIBITION.

NOTWITHSTANDING the awfulness of the tragedies of war, it is teaching some lessons to the people of the world that would have seemed impossible before it began. A few years ago one would have been scorned if he had predicted that Uncle Sam would forbid the selling of liquor to his boys in uniform but now we are face to face with such a reality.

The government has realized that the soldiers cannot be the most efficient if their minds are under the influence of liquor and it is also beginning to realize that no one can accomplish the most if his senses are disturbed by rum. When the National Congress submitted the constitutional amendment for prohibition it was only doing the will of the majority of the American people and now that the States have begun to

ratify this amendment it seems that King Alcohol is making a last feeble effort in the United States.

It is hard to understand how anyone with common sense could sanction the use of badly needed foodstuffs to produce liquor of no value whatever. And why does a uniform make any difference? Is it not just as harmful to the civilian as to the soldier? If the soldiers are more efficient without liquor, why would civilians not be also? The brewers and distillers can make no answer.

And, again, thousands of people have suffered from the lack of coal while the smoke has blown from the stacks of the breweries all winter long, in their ceaseless efforts to make money. May the day soon come when we shall have national prohibition and the farmers' crops be used where they will do the most good.

MORE CROPS WITH LESS LABOR.

THE farmer is urged to raise more crops in spite of the fact that the war has taken a large part of his labor supply. How can he grow more crops with less labor? It cannot be done by increasing the acreage because that requires more labor and most farmers are farming as much or more than they can properly care for now.

There probably is no section of the country where seed beds were not poorly prepared last year, and growing crops poorly tended and ripened grain lost because of the lack of help. Thousands of acres of valuable crops were literally lost because farmers had planted too many. The lesson has been learned and it now remains as a warning for this year.

The production of food with the same or less labor can be accomplished only by increasing the acre yields of land now cultivated. This can be done by the use of higher yielding seeds, better prepared seed beds, more intensive cultivation, a wider use of fertilizers and the conservation of manure.

TILE DRAINAGE.

ALTHO tile drainage has been advocated by practical farmers for many years as one of the best investments that a land owner can make, there are thousands of acres in Ohio today that are only partially drained. Every one of these acres could be made more satisfactory to own and till and more productive if they were entirely drained.

While maximum production is needed and desired by all, it can never be secured until tile drains are laid in sufficient quantity and in the swamps and waste places. These, containing the richest lands of their particular sections, can be made the most productive by the aid of drainage projects and by intelligent farming. While tile drainage may be an expensive operation yet those who are best acquainted with it admit that they could afford to borrow money to do the work.

The past year has shown the advisability of planting crops as early as possible. This can be aided greatly by drainage. Wet, water-logged soils require from one to two weeks longer than the drained soils to prepare them for a seed bed and when they are ready the ground remains colder for another week or more. The farmer who is operating a well drained farm can have his crops growing at least two weeks earlier than the one whose farm is poorly drained. The advantages of good drainage are so many that it seems impossible that modern farming should be attempted without it.

Home Economics Department

CONSERVATION CANNING

ELSIE STEIGER, '18

IT IS unnecessary to make the statement at this time that food will win the war. We realize that if our supply of food is cut off we can accomplish nothing. Do not misconstrue the statement and think that we must eat as much food as we want, or as we have been used to eating, or think we must eat the same variety of dishes. The correct thing to do is to eat those foods which cannot be transported satisfactorily or cannot be used to advantage in Europe, such as cornmeal, poultry, fish and certain canned goods.

Not only should we use the canned materials which we have been in the habit of preparing but we must utilize all the leftovers. All the leftovers which will not be used immediately should be canned. It is seldom that we have any meat left but there are times when we accidentally overestimate the amount needed for the family.

Meat can be prepared by slicing it into convenient sizes to pack into sterilized glass cans as tight as possible. If any gravy remains it may be heated and poured over the top to fill the jar or a sufficient amount of boiled water may be added to the can. After partially sealing, place in a steamer and steam for three hours, then seal tightly.

Large bones should not be allowed to go to waste in the kitchen. They can be sawed into small pieces and boiled for several hours for a soup stock. When it has been boiled down sufficiently it should be placed in a sterilized can and sealed tightly. The boiling down of the bone for soup stock should be done when we have a hot stove as it is not economical to heat the stove for the boiling of the bone itself.

Farmers who butcher for themselves in the winter can utilize all the meat by canning that which is not required for immediate consumption. The tougher pieces can be ground up and prepared as loaf or simply as ground meat. After this it should be treated in the same manner as the leftover meats are.

Vegetables are often found among the surplus foods. When there is not a sufficient amount to make a dish for a meal several kinds can be combined to make a palatable vegetable stew. This may be canned and served later when the vegetables are out of season. In so doing variety in the diet can be constantly obtained. The following recipe for vegetable stew is suggested:

½ c carrots	1 tbsp onion
⅓ c turnips	3 tbsp butter
½ c celery	1 tsp parsley
1½ c potatoes	1tsp salt
1 qt. water	Pepper

Cut the vegetables into one-half inch cubes. Sante' in the butter or other fat until a delicate brown. Add salt and pepper and lastly the water, hot. Simmer for one hour. Add potatoes for the last 20 minutes. When preparing this for canning it is not advisable to cook until all of the vegetables are soft but when half cooked it may be packed in a sterilized can and partially sealed. Other kinds of vegeta-

bles may be substituted but cabbage should not be sante'd as the others.

Eggs may be conserved as well as meat and vegetables. Altho they have increased in price immensely, they seem to be an indispensable form of food. In the making of certain cakes or sauces we sometimes use more yolks than whites. These should not be allowed to waste as they are rich in food value. If they cannot be used in other dishes they should be placed in a clean pan, covered with cheese cloth, and allowed to dry. The whites can then be broken into small pieces and placed in some container. Cold water may be used to soften this when it is to be used.

Not only can we do conservation canning in the home but the city may begin to conserve and can the surplus food which is often allowed to decay in the market. In New York City, the city canning and drying kitchen was established to can food which could not be sold at the market.

The operation is as follows: The work on the market is in charge of one woman who has a free privilege there. The labor in the kitchen is volunteered and with the aid of the Boy Scouts food which would not pay the merchant men to handle can be saved. Sterilized jars are ready and the work begins as soon as the food reaches the kitchen. The cold pack method is used when possible and 20 per cent more sterilization is given than demanded. The filled jars are stored in the same building. The entire cost is calculated and the food sold direct to the public at cost. The following data gives some idea of the amount of work done in one day: one hundred and fifty pounds of grapefruit, 300 pounds of turnips, 1,000 pounds of pineapples, 1,200 pounds of cabbage and 5 barrels of beans.

TEXTILE SHORTAGE IN AMERICA

FRANCES BELL, '18

ONE of the best things the war has done for you and for me is to teach us that we can do without many things we thot necessary heretofore. So far, not necessity so much as patriotism has mothered the invention of a new standard of dress among women in America, but now we are beginning to realize that there is a shortage on all fibers. But extravagance is unnecessary to the art of dressing well, in fact, the best dressed women are rarely extravagant. A sense of fitness and a simplicity of line invariably mark the well dressed woman.

With the scarcity of wool so familiar to us all, the art of substitution has developed. There has not been much noticeable decrease in wool clothes because what is on the market now was made before the United States entered the war. But prices have increased and next winter we will have to accept a "mostly cotton" winter garment. The United States is having to clothe her soldiers with wool besides sending a great number of our sheep to the allies for meat.

There is not such a decrease in the supply of silk as in wool so we may use it as a wool substitute. Of course France, Italy, Russia and Spain cannot furnish the world with the usual supply but our main supply comes from China and Japan and these countries have increased their output. The great

increase in the price of silk has been caused by its extensive use for bandages, aeroplanes and balloons.

On account of the war our supply of linen has almost entirely ceased because the European countries which are at war have furnished most of the world's supply. The United States which usually gets large imports from Germany had not been able to get any from that source for over two years before we entered the war. War shortage means cotton instead of linen, for the United States produces flax for seed rather than for fiber and this is a great cotton growing country. The demand for linen made by the war has been great also. Linen makes the best bandages and when it can be procured it is used for the wings of aeroplanes.

Cotton is the most satisfactory and cheapest of all vegetable fibres and is now being substituted for all others. What shall we do when the cotton gives out? The United States supplies three-fourths of the world's output and this supply has not decreased any. Besides being used as a substitute it is used more than any other fibre in this war. It is used in making explosives and in packing machine guns and it is said that one-half bale of cotton is used every time a gun is fired. It is used in all Red Cross work and in every hospital. The government has bought all of the Sea Island cotton to be used for aeroplane wings for it is the longest and strongest and can be used in place of linen. So now we are having to pay higher prices for cotton materials and are getting poor qualities.

Other fibres as hemp are now being grown extensively in the United States and these can be used in place of linen to a certain extent. What is the solution of this great problem?—dress conservation and a new standard of dress for women. We can show our patriotism now by taking care of what clothes we have and being willing to accept substitutes and poorer qualities so that the government may have the best.

Olga Elifritz, '17, is working in the agricultural extension department at the Ohio State University.

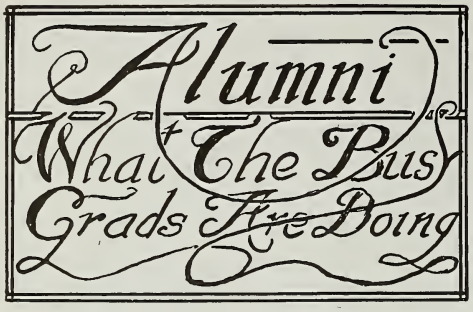
Gertrude Matthias, '15, is teaching home economics in the Cleveland schools.

E. Josephine Jones, '17, who was the home economics editor of The Agricultural Student last year is now the general secretary of the Y. W. C. A. at Ohio Wesleyan University at Delaware, Ohio.

Margaret Gullette, '17, is teaching home economics at Fremont, Ohio.

Mrs. Leslie Lapp, '13, who was formerly Miss Hazel Williams, is teaching home economics in East Cleveland, O.

Hazel Lyne, '17, has charge of a tea room at the Luidner Company in Cleveland, Ohio.



Archie Bishop, '15, is teaching winter course agricultural students at the Ohio State University during the 1918 session. He is in the Percheron breeding business as a member of the firm of Wesley Bishop and Son, Delaware County, Ohio.

Leon M. Evans, '16, is teaching an animal husbandry subject in extension schools this winter.

J. P. Markey, '16, is farming near Eaton, Ohio.

W. H. Boner, '17, is in charge of a cow testing association at Salem, Ohio.

Wilson Bailey, '17, is farming at Barnesville. He is a member of the firm of Allen Bailey and Sons, breeders of Jersey cattle.

Francis Marshall, '13, is farming near Bluffton, Ohio.

Russel George, '16, is superintendent of Hilltop Farm at Wheeling, West Virginia. He has charge of a large herd of Ayrshires, one cow of which has recently made a world's record in milk production.

J. O. Williams, '07, is in government extension work in animal husbandry at Clemson College, S. C.

W .R. Wheelock, '13, is county agent of Trumbull County and is located at Warren, Ohio.

Lewis Fudge, '13, is engaged in Boys' and Girls' Club Work with the extension department of the University of Minnesota.

R. F. Crim, '13, leaves Benson, Minnesota, on February 1, to become county agent of Cottonwood County, Minn. At Benson he has been employed as public school agriculturist.

B. A. Schnell, '13, is county Y. M. C. A. secretary of Lake County. C. L. Long, '13, is agricultural agent of the same county. Their offices are located at Painesville, Ohio.

B. E. Pontius, '14, has left Alfred University, New York, to become assistant professor of animal husbandry at the Massachusetts Agricultural College at Amherst.

C. J. Fawcett, '14, is in the animal husbandry department of the New Hampshire Agricultural College at Durham, New Hampshire.

H. A. Stillman, '14, is running the city milk route at Andover, Ohio.

Eugene Piper, '14, is farming at Ashtabula, Ohio.

John Hervey, '12, is interested in the breeding of Jersey cattle at Jefferson, Ohio. He is also Food Administrator for his home county.

Harry Jones, '13, is herdsman at the Athens State Hospital. He has made quite a record testing Holsteins.

Vernon Crouse, short-course '17, is herdsman for Hugh Bonnell at Youngstown and helping to break some of the Jersey records of Ohio.

D. R. Vanatta, '10, is county agent of Hamilton County and has his office in Cincinnati.

Noel R. Myers, '16, is teaching agriculture and manual training in the high school at Brooklyn, Iowa.

Roy S. White, '12, is farming 550 acres near Orient, Ohio.

Otho Pollock, '12, is breeding Percherons at Delaware, Ohio. He is also secretary of the Delaware County Percheron Breeders' Association.

UTILIZING WATER POWER ON THE FARM

C. H. SPRAGUE, '19

POWER is the dominant word today as people everywhere are making use of all sources that are capable of furnishing it. Water furnishes the cheapest source known and today Niagara Falls and other smaller falls all over the country are furnishing energy for the production of material for Uncle Sam. Even the small waterfall on the farm besides furnishing convenient power for the owner does its bit for the country by saving fuel.

The three most important factors to be considered in the harnessing of a stream are: first, the volume of water or the number of cubic feet that flows by a fixed point in one minute; second, the amount of head that can be secured; third, the nature and geology of the land. A very simple method of finding the approximate quantity of water a stream furnishes is to take several measurements of the depth of the stream and obtain an average. By multiplying this by the width the cross section can be obtained. The velocity is found by measuring 100 feet and throwing a small piece of wood or a chip into the stream and finding the time it takes to negotiate this distance. Two or three trials should be made and an average taken. Due to friction along the bottom and sides, the mean velocity has been found to be only .8 of the velocity of the surface water. By multiplying the cross section in square feet by the velocity, the quantity of water in cubic feet per minute is found. Knowing the head and the number of cubic feet flowing per minute the theoretical horse power can be determined and also the size of water wheel that is best adapted can be selected.

Usually for small streams the overshot wheel is the most satisfactory. One company puts out a wheel that has tested over 90 per cent efficient which is exceptional rather than the case with wheels of this type. The theoretical horse power is found by

$$\frac{q \times 62.4 \times h}{33{,}000}$$

Where q=flow in cubic feet per minute.

62.4=weight of one cubic foot of water.

h=total height water falls in feet.

A more accurate method of determining the flow is by means of the "Weir Dam." This consists of a notched board that is imbedded in the banks of the stream so that all water must pass thru the notch. The length of the notch should not be over half or two-thirds the length of the board and should be beveled down stream so as to create as little friction as possible. The width should be about two-thirds the width of the weir. Care should be taken to see that the notch is level across the stream so that there will not be an uneven depth of water as it comes thru the notch. It is evident that the water, due to curving as it goes over the weir, is not as deep over the notch as a few feet upstream; so the correct depth of the water as it goes over the dam is determined by driving a stake about five feet upstream and its top on a level with the bottom of the notch. When the water runs over the weir, the depth from the top of the stake to the surface of the water is measured, thus giving the depth of water flowing thru the notch. With the depth of the water and the width of the notch known

$Q = 3.33 \times W \times h \times$ square root of h.

Where Q=flow in cubic feet per second.

W=width of notch in feet.

h=depth of water flowing over the weir in feet.

With the flow and possible head determined, the horse power is then calculated. $H.P. = \frac{Q \times 62.4 \times 60 \times h}{33{,}000}$

When one knows the horse power a stream will develop he has a working basis on which he can determine the value of the stream as a source for lighting the farm home, grinding or sundry operations. At no time should a farmer overlook the fact that perhaps the stream peacefully flowing thru his property could be made to produce cheap power.

A SUCCESSFUL COMMUNITY THRESHING RING

ELEVEN neighbors living along the same pike south of Grove City in Franklin County, Ohio, have been able to realize eight per cent dividends upon the money which they have invested in a co-operative threshing outfit. This enterprise was begun twelve years ago by some of the present members and their fathers. The machine which was used during the first eleven years was traded for a new one last year, but was used by its new owner in threshing over 20,000 bushels of grain this year, thus proving that it was far from being worn out. On this basis it is thot that the new machine should be good for 15 years of service.

The new machine cost about $3,000. It was used to thresh 18,000 bushels of wheat and 2,000 bushels of oats this year. At six cents per bushel for wheat and four for oats, this amounted to $1,160. Each man paid his own threshing bill and the money was in the hands of the treasurer who paid all expenses. All accounts were settled at a meeting of the members just after the threshing season was over.

A member of the company was hired to run the engine thru the entire season and another cared for the separator. Each bought the oil, grease and repairs as they were needed. These two items constitute the main part of the expense.

It has been found necessary to establish some system for threshing so the machine starts at one end of the road one year and at the other end the next year. Thus each one knows just when the machine will get to him.

A shed was built for storing the machine on a farm of one of the members. When the work is done every one in the company takes a day off to help repair the machine and place it under cover.

The members feel that this method is advantageous as well as being profitable. They are able to thresh their grain when it is ready without waiting for a thresher to come to them. This has saved them many dollars in the past twelve years, as there have been times when the grain would have rotted before a thresher could have gotten to all of them. Now each one knows just when his turn is coming and there is no dependency upon the whims of others. When one job is done the machine moves immediately to the next place so that the threshing is done without loss of any time. Thus it is the foundation of a neighborly co-operative spirit that is showing its influence in other lines of work as well as in the improvement of the social life of the community.

SAVE FOOD BY DESTROYING RATS

DAVID E. LANTZ, Washington, D. C.

ON many farms rats and mice waste enough grain to more than pay the owner's taxes. To prevent so great a loss is well worth serious consideration by farmers at all times. In the face of food conditions forced upon us by war, suppression of the rat menace is a measure for economic gain as well as for national security. For these reasons the United States Department of Agriculture and the Food Administration have united in a nation-wide effort to rid American farms of the rat.

The common brown house rat, known sometimes as the Norway, or sewer rat, is the worst mammal pest in the world and in spite of man's incessant warfare against it, has increased in numbers and extended its range. Its dominance is due to remarkable fecundity and ability to adapt itself to all surroundings. It breeds from four to ten times a year and brings forth an average of ten young at a time. Females breed when four or five months old. The species feed on all kinds of vegetable and animal matter.

While it is impossible to ascertain the damage done by rats and mice in the United States, all attempts to calculate the losses, based upon reasonable premises, result in totals that are astoundingly large. The direct loss cannot be less than $200,000,000 a year and may be far greater.

It is odd that such a drain upon wealth should receive so little attention in ordinary times but now, when all our resources are needed to win a great war, further neglect of this cause of waste is criminal. We must destroy the rat and keep our foodstuffs from its defiling touch.

A rat having access to grain will consume an average of two ounces a day or 45 pounds a year. When wheat is worth $2 a bushel, this amounts to $1.50. But the grain carried away and rendered untfit for use is far more than that actually eaten, and the average cost of keeping a rat on the farm or in a warehouse is from three to five dollars a year. Some farms and warehouses harbor hundreds of rats, an appalling tax on the owners of such premises.

Besides being an unparalleled waster of food, the rat is a menace to the life and health of human beings. It is said to carry and disseminate the germs of tuberculosis, septic pneumonia, epidemic jaundice, measles, diphtheria, typhoid, scarlet and other fevers. Its parasites convey bubonic and pneumonic plague to man; its bite sometimes produces "rat-bite fever;" it is the active agent in perpetuating trichinosis in the pig; and it has been suspected of being a carrier of infantile paralysis. Besides, it is subject to loathsome diseases, such as rat leprosy.

Many agencies may be mobilized for rat and mouse repression. Farmers' clubs, women's clubs and other civic organizations can render a national and patriotic service by taking up the rat question locally and planning to carry out campaigns for destroying rodents and protecting foodstuffs from their ravages.

The means suitable for destroying rats include traps, poisons, dogs, cats, ferrets, fumigation, and various weapons of offense. Traps however will account for the greatest number of victimes. The guillotine type of trap

which kills by striking the animal with a wire fall, driven by a coiled spring, is especially recommended.

Rat-proof buildings and the use of practical devices for keeping the rodents from stores of food and merchandise are essential factors in food conservation. No single method of keeping rats and mice from a building is better than the use of concrete in its construction.

Clubs may be organized for the express purpose of destroying rats. Such clubs usually hold contests and offer monthly prizes for rat killings. By the expenditure of comparatively small sums these associations accomplish better and more lasting results than have been attained by premiums or bounties.

The Bureau of Biological Survey, United States Department of Agriculture, is prepared to give instructions for destroying rats and mice and protecting foodstuffs from their devastations. Suggestions for the formation of rat clubs are also offered and, if called upon, the Bureau will assist local authorities in putting down the rat plague.

University Spring at Mirror Lake

Founded 1842

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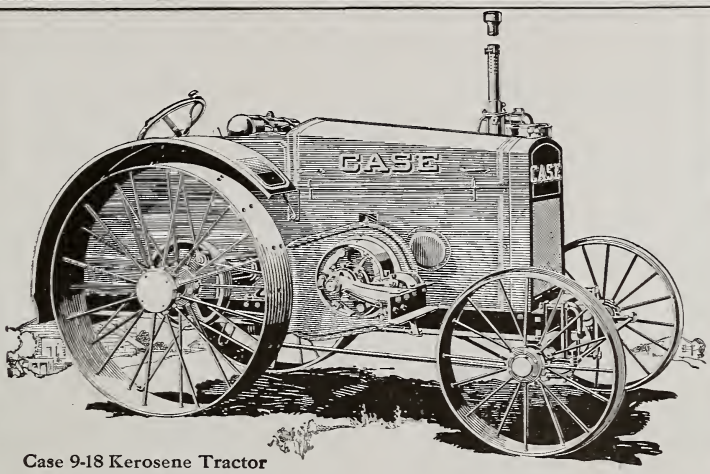
Famous the World Over



Case 9-18 Kerosene Tractor

Agricultural Engineering Department

of University of Nebraska Test Case Tractors

Numerous tests of Case Tractors were made in 1917 by the Agricultural Engineering Department of the University of Nebraska, under the direction of Prof. L. W. Chase, assisted by Prof. O. W. Sjogren, Mr. Louis Runnels and Mr. Ray W. Carpenter.

The object of the experiment was to determine under actual farm conditions the amount of fuel required and the rate of doing various field operations, and to study the quality of the work done. Also to determine the effect of different depths of plowing.

This is the first official test of its kind ever held and presents data hitherto unobtainable.

A bulletin has just been issued covering these tests. A copy will be mailed free upon request. This bulletin has created great interest at the different Agricultural Colleges as well as among farmers.

Write for your copy today.

J. I. CASE THRESHING MACHINE CO., Inc.
(Founded 1842)
897 Erie Street, Racine, Wis.

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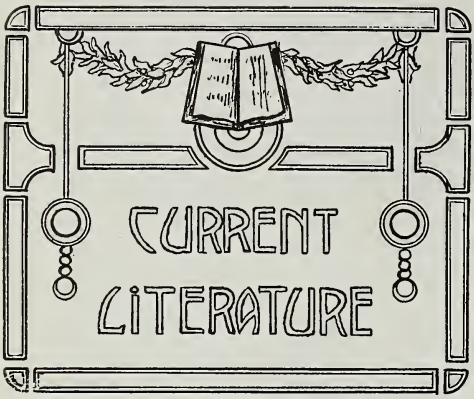

IN HIS book entitled, "Fertilizers and Crops," Lucius L. Van Slyke, of the New York Agricultural Experiment Station, gives practical methods for using fertilizers in crop growing with special emphasis on the reasons underlying their use and on the conditions of their greatest efficiency. This book is the result of an appreciation of the farmers' point of view and it seeks to arrange for his use many of the facts that he needs to know. Part one is devoted to the factors of soil fertility dealing with the soil constituents and plant foods. This is followed by a discussion of the sources and composition of materials used as fertilizers and manures. Factors in the selection of fertilizing materials and the practical use of these materials in the growing of individual crops complete the work.

734 pages, 200 illustrations, $2.50. Orange Judd Company, New York City.

"Soil Physics and Management" was written by J. G. Mosier and A. F. Gustafson as a text for college work. The book tells of the origin and composition of the soil and its placing by wind and glaciers. The classification of the soils is followed by a complete discussion of the physical properties of soils and the action of soil water. One chapter is given to the alkali lands and their treatment. Temperature, soil organisms, tillage, erosion and rotation are each fully treated. The appendix contains tables giving the average yields and acreages of crops in the United States and the values of farm lands.

417 pages, 202 illustrations. J. G. Lippincott Company, Philadelphia, Pa.

"Modern Fruit Marketing," by Bliss S. Brown, contains much information that is valuable to the fruit growers and dealers. The latest approved methods of hauling, harvesting and selling fruits are fully described. Grading and packing fruits and the making and handling of packages are discussed and explained. Co-operative organizations and other channels thru which fruits pass are also described. The final chapter is devoted to fruit shows and conventions. Not the least important is the discussion of fruit storage and its value to the producer and consumer.

283 pages, 136 illustrations, $1.25. Orange-Judd Company, New York City.

"Poultry Breeding and Management" is the title of a new book by James Dryden, of the Oregon Agricultural College. This book was written for the man or woman on the farm or in the class room who is interested in making poultry pay. The author makes a strong plea for greater attention to the breeding of fowls for production. A history, evolution and classification of the various breeds is given. Breeding, housing and feeding of fowls are considered and explained from the scientific standpoint. Incubation and the marketing of poultry are followed by the final chapter on diseases and parasites of fowls. The experience of the

author makes this book one of the best authorities upon the subject of poultry.

402 pages, 300 illustrations, $1.60. Orange-Judd Company, New York City.

NOTICE!

If anyone has a copy of the October, 1917, issue of The Agricultural Student which is not wanted, we would be pleased to receive it as all available copies have been used, and some are needed in the office.

D. C. Mote, '10, is in the animal husbandry department of the Ohio Experiment Station at Wooster.

Carl Nims, '11, is in charge of the Holstein herd of Mr. King near Mentor, Ohio. He has become known as one of the most skillful feeders of test cows

Thomas Wheeler, '05, is editor of the Indiana Farmers' Guide published at Huntington, Indiana; its circulation is more than 140,000.

L. P. McCann, '15, formerly in the animal husbandry department at Ohio State University and lately of the same department at the Pennsylvania State College, became Pig Club Agent for Louisiana on January 1, 1918.

Glen G. Hayes, '12, is managing editor of "Better Farming," Chicago, Ill., a monthly publication with a circulation of 350,000.

Charles E. Snyder, '09, is the editor of The Farmers' Review, published at Chicago, Illinois.

Bascom Brothers
— MAKERS OF —
Saddle and Sirloin Medals
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Three-Year Ag. Class Pins
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11th AND HIGH STREETS

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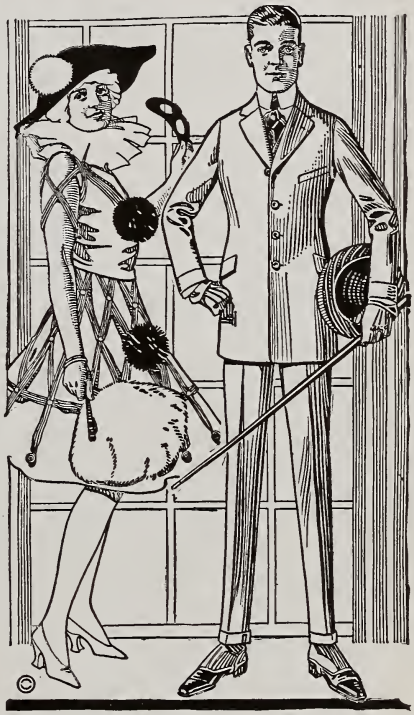

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DRY CLEANING, PRESSING.

FEBRUARY NEWS FOR SCHOOL AND FARM

NEW AGENTS APPOINTED.

L. L. Mowls, '10, began work as county agent in Licking County on January 1. Since graduation he has been operating a dairy farm near Bayard, Ohio.

M. F. Detrick, '12, began work as agent for Rush and Hancock Counties in Indiana on November 1. He was formerly operating a general farm near Bellefontaine, Ohio.

O. D. Smith, a graduate of the University of Arkansas, has been appointed county agent for Lawrence County. He was formerly employed at a tester for the Western Hamilton County Cow Testers' Association. His office will be located at Ironton.

A. A. Olsen, a graduate of the University of Illinois, has been appointed agent for Crawford County. He was a graduate assistant in the department of agricultural chemistry at Ohio State University until December 1, when he left school to become assistant county agent in Sandusky County.

SEED CORN TESTS.

In view of the alarming reports coming to the College of Agriculture regarding the seed corn situation, the extension department is making an effort to determine the exact status in Ohio. Effort is being made to secure a number of samples from every county in the state for germination tests. In the meantime, posters are being mailed to every school in the state, urging the testing of corn in the class rooms.

Due to the early frost and the consequent harvesting of much corn of high moisture content, which the hard December freezes rendered unfit for germination, the supply of good seed corn will be limited. Germination tests at the Ohio Agricultural Experiment Station show that many of the tests are as low as 50 percent.

SHORTHORN SHOW AND SALE.

That the small breeder of Shorthorn cattle can win in competition with large breeders in the show ring as well as top the sales was shown at the third annual Shorthorn Show and Sale held at Columbus on January 9-10, when a yearling bull calf owned by F. E. Gordon, of Mt. Gilead, sold for $2250, the top price of the sale, to M. & J. Schaffner, of Erie, Pa. He was the champion male of the show.

The champion female of the show was a red heifer, Maggie 23rd, bred and owned by John Gunsett and Son, of Convoy, Ohio.

FEEDING EXPERIMENTS.

To find a more efficient and economical way of combining proteins in the rations for farm animals is the object of an experiment now in progress at the College of Agriculture. This is in charge of Prof. John F. Lyman, of the department of agricultural chemistry and Prof. Charles S. Plumb, of the department of animal husbandry. It was planned by the leading authorities on feeding animals and is in cooperation with other colleges under the supervision of the National Council of Research.

Four calves are used in the trial. A ration is fed in which 30 percent of the protein is supplied in alfalfa hay, 10 percent in corn meal, 25 percent in linseed meal and 35 percent in peanut meal. The test will continue for 6 months.

CORN AND MILK FOR PIGS.

Bulletin 316 of the Ohio Agricultural Experiment Station shows the results of feeding corn alone to pigs. Two pigs weighing 43 pounds gained a third of a pound daily when fed only corn for 15 weeks and then for eight weeks they gained 1 3/5 pounds daily on a ration of skim milk and corn.

Seven pounds of corn was fed for one pound of gain when corn was fed alone but it only required two pounds of corn and 11¼ pounds of skim milk to produce the same result. Feed cost 8.56 cents per pound of gain from corn alone and 4.88 cents from the corn and skim milk ration.

FERTILIZERS STILL PAY WELL.

Manufacturers of fertilizers are urging farmers to place orders early because no relief is in sight for the car shortage. If orders are delayed until spring it is likely that the needs of farmers can not be met but early ordering will enable the manufacturers to ship in car load lots.

Acid phosphate in 10 tests in eight counties of Ohio has returned 95 bushels of corn per ton. It cost $16 and returned $47.50 with corn at 50 cents per bushel. Even if it costs $24 a ton

Nitrate of Soda

Data as to increased crop yields due to the use of Nitrate are available. Why not make your business of crop fertilizing profitable by the use of Nitrate of Soda whose efficiency is known?

A bushel of corn or wheat or a bale of cotton today will buy more Nitrate and more Acid Phosphate than ever before.

Send for "Increased Crop Yields from the use of Nitrate of Soda"

Dr. WM. S. MYERS, Director
Chilean Nitrate Committee
25 Madison Avenue, New York

Does a Clean Job— Saves a Lot of Work

That's the story of "SCALECIDE," the premier dormant spray. It will absolutely clean up San Jose scale—will also control apple canker, collar rot, bud moth, case bearer, aphis, pear psylla, etc. No other spray will do *all* this. "SCALECIDE" can be put on in one-half the usual time—a great saving in labor and you get through on time. Pleasant to handle. **Sold on Money Back Basis.**

Send today for booklet No. 14.

B.G. PRATT CO., M'f'g Chemists
50 Church Street
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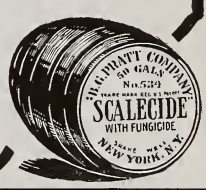
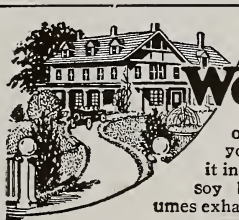




This or This
Wealth or Poverty

on your farm depends upon the richness of your land in nitrogen. Nature's way is to put it in the ground through leguminous plants—clover, soy beans, alfalfa, vetch, etc. Uninoculated legumes exhaust the land—naturally inoculated legumes enrich it.

Nature's Easy Way Makes Poor Land Good—Good Land Rich.

McQueen's Inoculator

Guaranteed to Produce Nodules. Pumps Nitrogen from the Air.

produces greater crops, enriches the land, and never fails. Bacteria are bred under adverse conditions. Only the strongest survive, and these will make your legumes grow, *Get Our Free Book*—Learn how McQueen made clay hills into a garden spot, discovered Nature's Way, and bred nitrogen bacteria full of pep, and guaranteed to live and work anywhere. Write today—it's dollars in your pocket.

McQUEEN BACTERIA CO., - - *Box* 292, Baltic, Ohio

today and corn sells at $1.25 per bushel, the net return will be $94.75. Order early.

LATEST BULLETINS.

The following list gives some of the latest bulletins that have been published and can be secured by writing to the place of publication. Farmers' Bulletins 855, Homemade Silos; 856, Control of Diseases and Insect Enemies of the Home Vegetable Garden; 870, The Community Fair; 872, The Bollworm or Corn Earworm; 887, Raspberry Culture; 889, Backyard Poultry Keeping; 890, How Insects Affect the Cotton Plant and Means of Combating Them; 892, Spring Oats Production; 893, Breeds of Dairy Cattle; 901, Everbearing Strawberries; 906, The Self Feeder for Hogs; 913, Killing Hogs and Curing Pork; 919, The Application of Dockage in the Marketing of Wheat; and 284 of the Experiment Station at Madison, Wisconsin, on Tile Drainage on the Farm; 282 of the same station on Cooperation in Wisconsin, and 206 of Purdue University at Lafayette, Indiana, on Winter Steer Feeding.

PORK PRODUCTION CAMPAIGN.

In order that pork production in Ohio may be increased, a campaign has been started in which one man from each of the principal hog producing counties of the state has been appointed to encourage an increased production of hogs during the coming year and to carry the hogs which are now on feed to a heavier weight than is customary. At the present time there are 16 men from the leading hog producing counties of the state in this work. The farmers that have been reached thus far have

SEED CORN

For the first time since we went into the business, we are worried because we fear that our stock of seed corn is too small for this year's requirements. It was not our fault, because we had out a very large acreage but premature frosts and hard freezes eliminated large blocks that were meant for seed. We have a moderate supply of every stock quality. Corn that will germinate 98 per cent. This corn is all pedigreed, includes our famous Improved White Cap and 120 Day Yellow, both of which have taken a prominent part in Ohio, and winning state contests. Also limited stocks Minnesota 13, the best very early corn we believe that has ever been introduced into the state.

Do not forget that we also handle the best of everything in vegetables, flower seeds, plants, bulbs, etc.

WING SEED COMPANY

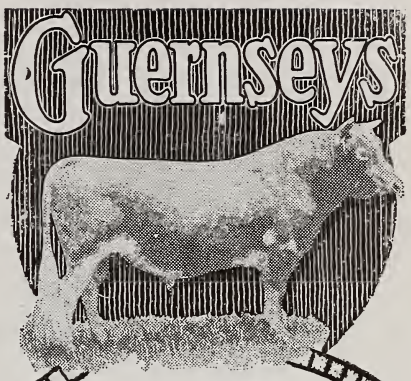
Box V., Mechanicsburg, Ohio

promised to breed 1000 more sows this spring than would have otherwise been bred.

The Ohio Experiment Station has completed experiments that furnish evidence that hogs may be profitably carried thru a longer feeding period. These experiments show that the rate of gain was greater for each successive 100 pounds until a weight of 300 pounds is reached. With one exception, the feed required per unit of gain increased as the pigs increased in weight. Farmers who do not have a large number to consume their soft corn can make good profits by carrying them thru a longer period. This extra gain is largely fat, one of the things most needed at the present time.

W. L. HAMMOND.

Jesse E. Whonsettler, '16, is farming at his home place near Creston, Ohio.



QUALITY

DISTINGUISHES GUERNSEY PRODUCTS

The highest Natural Golden Yellow color, delicious individual flavor, and high content of butter fat—combine to make Guernsey milk in greatest demand by discriminating consumers.

Write for information relative to Guernseys, to

AMERICAN GUERNSEY CATTLE CLUB

Box Y Peterboro, New Hampshire

PROF. W. J. RADER'S Private Academies of Dancing

NEIL AVE. ACADEMY

647 Neil Ave. Phones: Citz. 4431; M. 6189.

Dance Correctly.

Beginners' Class—Wednesday evening, February 20.
Advance class Monday evening.
Reception Night Thursday evening.
Reception Night Saturday evening (front hall).

NEIL AVE. PAVILION

Open Tuesday, Friday and Saturday evenings.

OAK STREET ACADEMY

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A strictly private place for Club Dances and Private Classes that organize for special instructions.

TUITION:

Gentlemen, per term of 10 lessons	$5.00
Ladies, per term of 10 lessons	5.00
Private lessons, $1.00; six for	5.00

Tuition can be paid $1.00 per week until paid.
Private lessons can be had afternoon or evenings.
The Waltz, Two-Step and the late modern dances taught in one term.

REVIEW OF SOME ADDRESSES GIVEN THE SHORT COURSE STUDENTS

"I would not give the snap of my finger for American citizenship if the other side wins this war," said President Thompson in his address to the short course students on January 8. "You could not give me a farm in America. I would rather die tonight," he continued.

He was showing these farmers their place in the economic management of the war and how agriculture is related to the welfare of all human society. The farmer is not out in the country by himself and he never will be again but he is concerned with the economic management of the whole world. He pleaded with the farmers to save, not by going hungry, but by stopping waste. Seven bushels of wheat are required to feed a soldier one year and all of our surplus wheat had been shipped out before December 1. This means that if our army is properly fed our wheat must not be wasted and it must be substituted by something here at home so that we can send more to our Allies.

"Some people think that only the poor should save and be thrifty but this war is teaching another lesson, that of economic adjustment. That is, that all people must adjust their living to the satisfaction of others. We can eat more corn in America so that more wheat can be sent to France." Dr. Thompson says that this war is not going to be won by any bullets that may be shot, but that it will be won by that side which can prove itself the most efficient in the production and

Burpee's Seeds Grow

The Department of Agriculture estimates the value of back-yard gardens of 1917 at more than 350,000,000 of dollars. At least, 100,000,000 dollars have been added to the nation's wealth by the increased planting of 1917.

It is even more necessary to take care of the future. Demonstration gardens in many big cities planted with Burpee's Seeds have done their share to instruct the amateur gardeners. Burpee's Seeds have a forty-year reputation for the Best that Science can produce.

Burpee's Annual for 1918

has been greatly enlarged and improved in order that it may be of the greatest help to every gardener. It has 216 pages, 24 of which are in color illustrating more than 100 varieties of choice vegetables and flowers. Always a safe guide to Success in the garden. Mailed free upon request. A post card will bring it. Write for it today and mention Agricultural Student.

W. ATLEE BURPEE CO.

SEED GROWERS **PHILADELPHIA**

MERIDEL FARM DUROCS

THE POPULAR KIND

It took good sows and good boars to produce them. They came from ancestors of the **big type.** Those smooth quick feeders with strength, big bone and good action. Capable of doing their own harvesting for a large part of food from blue grass, clover and alfalfa pastures.

Always Glad to See You.

MERIDEL FARM, BLACK LICK, OHIO

On East Broad Street Nine and One-Half Miles East of Columbus, Ohio.
Where Good Sows and Good Boars Meet.

E. S. ALBAUGH

Manufacturing Jeweler

TWENTY-TWO EAST GAY STREET

The Jewelry Shop

FRATERNITY & CLASS PINS
LODGE EMBLEMS.

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HENNICK'S CONFECTIONERY

The one place around the campus where you can get good things to eat and drink.

The Euclid Academy of Dancing

HIGH ST. AND EUCLID AVE., 5 Minutes' Walk from O. S. U.

Assembly dancing every Thursday and Saturday.

Beginners' Class Wednesday evening.

Tuition: Gentlemen, per term of 10 lessons, $5.00; Ladies, per term of 10 lessons, $4.00.

Business and Res. Phones: Auto 16985; Bell, N. 1759.

Private lessons can be had any hour, morning, afternoon or evening: Single lessons, $1; Term of Six, $5.

Academy can be secured for Private Parties, Fraternity Hops, Card Parties, Etc.

Prof. H. J. Guerr

CORN MATURED

In time to evade the frost assured by the Tower System

Evidence continues to come from every quarter of the corn belt that where the Tower System of Cultivation was used far greater maturity was secured than where other systems of cultivation were practiced.

Nature's Way

These Corn Roots Within Five Inches of the Surface.

This illustration is true to nature, being made from a real photograph. The Tower System assists nature by making the best of mulches from row to row; even in the middles, without destroying any of these roots. They are also the very best of weed killers.

All of this, with the ease of operation, makes them the most desirable cultivators on the market.

We have a small booklet, just off the press, "Reasonable Reasons Why Every Corn Raiser Should Use Tower Tools," that we would gladly mail you on receipt of your address.

The J.D. Tower & Sons Co.

MENDOTA ILLINOIS.

(Original manufacturers of surface cultivators)

distribution of the food supplies to its soldiers.

"Many farmers of Ohio are dead, but they won't lie down," is the essence of the speech on the "Hedgerows of Ohio," as given by Samuel R. Guard, the associate editor of the Breeders' Gazette to the winter course students on January 11. By this statement he meant that many farmers of Ohio are living too much for themselves and for no one else, hence doing the world in general but little good.

"Farmers do not appreciate the beauties of farm life. They have not yet awakened to the newer and fuller idea of agriculture. Many farmers think that they have done a full day's work if they have worked from four in the morning till nine at night, no matter how clumsily or slowly they may have done their work or how little real good they have accomplished. The farmers must get this out of their heads.

"Ohio is the brain and new center of agriculture of the United States. She is the England and Scotland of America. We should have hedgerows on our farms as they do in England, a decided advertisement for the farm and a real countenance of the farm that will make the country boy yearn to stay on it. As well as in the idea of hedgerows, just so in all other things, we must work out our own ideas and not run to the city for them. The only mission of the College of Agriculture is to make men think. The farmers get tired of the 'should' business and when they do things because they really want to they will get some beauty in their farm life."

"It will soon be worse than ever as we must compete with foreign countries that do not require so many luxuries.

Nitrate of Soda
and Other Fertilizer Materials

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Central National Bank Bldg. Columbus, Ohio.

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THE OLD RELIABLE *Baker Art Gallery* STATE & HIGH STS.
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IT WILL ALWAYS BE BETTER.

Our photos are the most durable. We excel in the large variety of Exclusive Styles and Artistic Finish.

SPECIAL RATES TO ALL UNIVERSITY STUDENTS.

MARGARET NADDY-TURKOPP of the . . **Emerson Academy of Dancing**

HIGH AND WARREN

extends to the students of Ohio State University and their friends a most cordial invitation to attend the Friday evening dancing parties given for their pleasure and to enjoy the teachings of this select school.

CALENDAR FOR 1917-1918

Class Nights—Adults, every Monday, Wednesday and Thursday evenings, also Monday afternoon at 3 o'clock and Friday at 6:30.

Assembly Nights every Tuesday, Friday and Saturday evenings. Orchestra music.

Friday evenings for young folks.

Private lessons by appointment.

Children's Class—Seven to 15 years of age, every Saturday afternoon at 2 o'clock.

Information given cheerfully by phone.

Citz. 11958—N. 8682, N. 5902.

ATTEND YOUNG FOLKS' ASSEMBLY EVERY FRIDAY EVENING.

Special Dancing Parties: Feb. 14, Feb. 22, March 17, April 1.

The 'backwash' is now on. The first thing is to make money, but as soon as possible we want to get the pleasure out of it. Nature has prepared things for us so it is our duty to act and do our best. No one ought to be the manager of anything unless he has an interest in it.

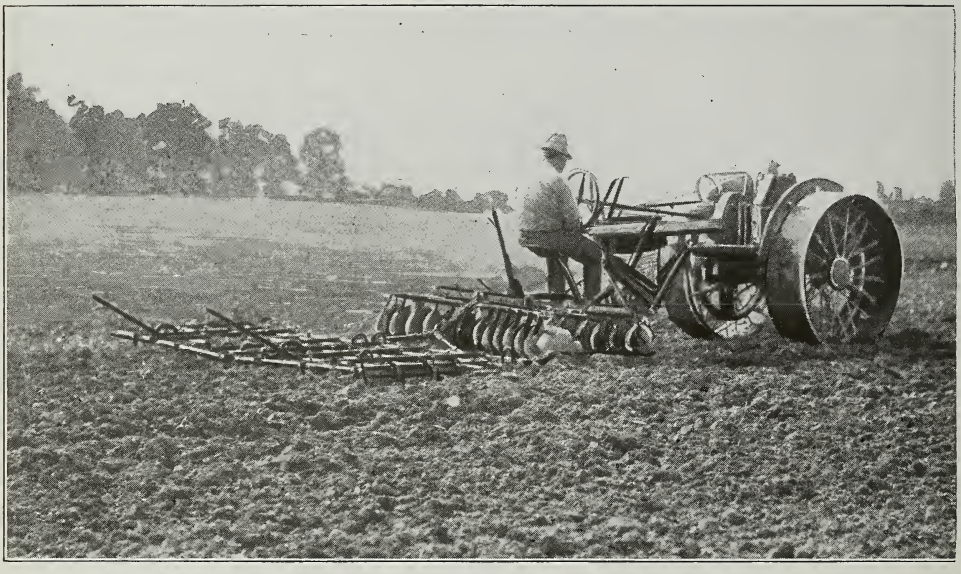
"John Deere did some thinking to get the first steel mould-board plow; McCormick the first binder; and Bill Whitely the Champion binder. If we know something about the early history of these tools and how they were developed we like to work with them better. This is what I call 'putting romance into agriculture.'"

"The big thing in an agricultural student's life is to know whether he should specialize or not. The better way is to be a specialist in as many lines as you can. We must broaden out and train our thinking powers as we are getting a bigger job ahead of us every day. The best crop on the farm is the children but we must think seriously in getting the best schools, sanitation and social life for them.

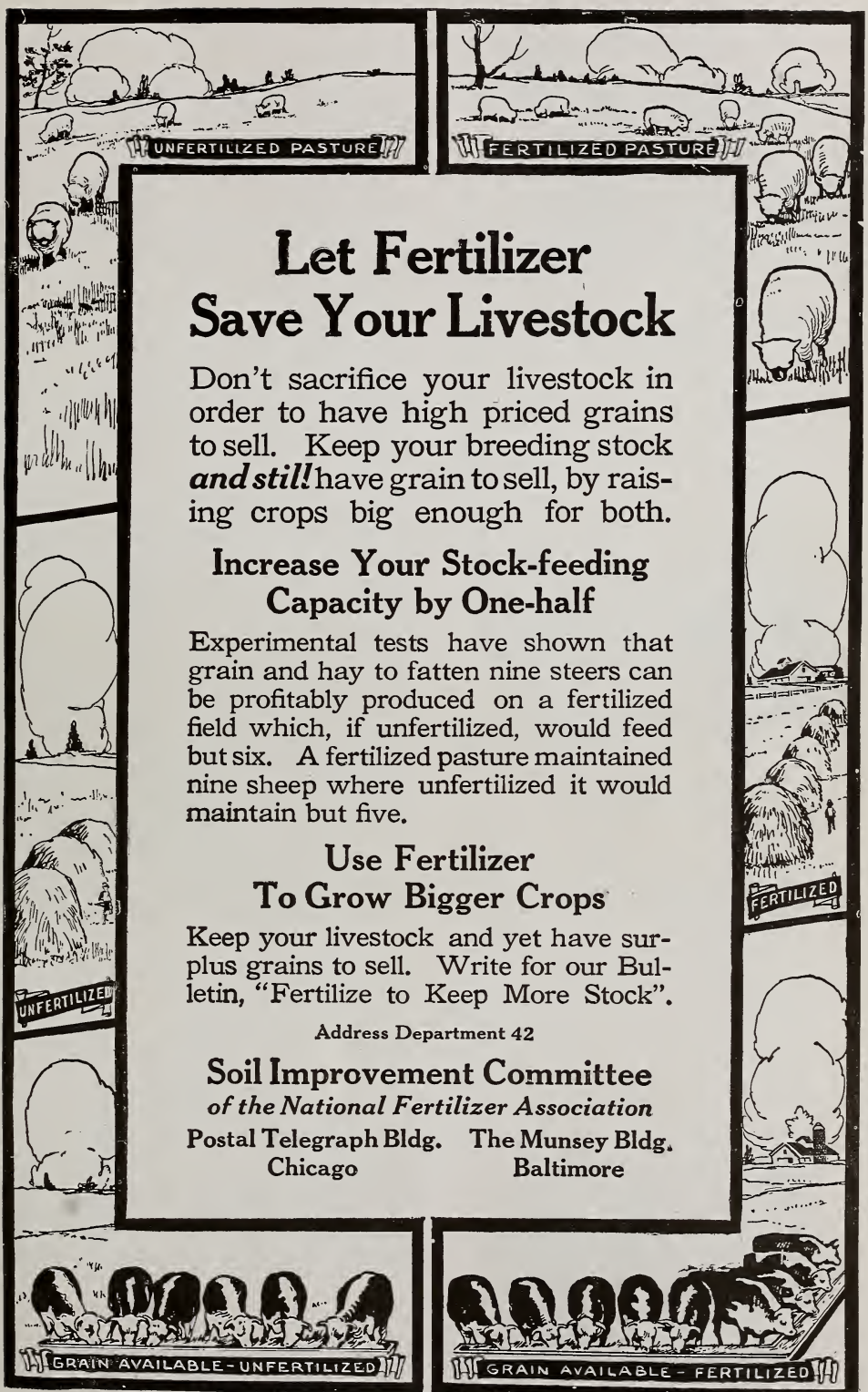
"We should get everyone in the state interested in our State Fair and a good way to do this is by acting out a pageantry of the agricultural life of each section on a competitive basis at the county fairs and the best trained should act their pageant at the State Fair."

"We have in Ohio the human stuff to make the best agricultural district in the United States. The Poland China, Duroc Jersey and Polled Durham were developed by Ohio men. The literature of farming should come from the farm itself, and we can write good farm stories as agricultural literature is nothing more than simple solid real facts."

"Let us have more hedgerows in Ohio and then the beauty, romance and poetry will follow and when we pray 'On earth as it is in Heaven' may it really be."



Doing the Work of Six Horses and Two Men



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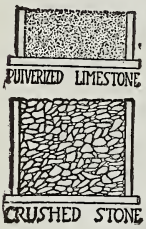

The Jeffrey Lime Pulver will pulverize from 1 to 7 tons per hour and can be operated with engines from 8 h. p. to 30 h. p., reducing big 60 lb. rocks to dust. If crushed stone is wanted, simply push a lever. Crushes to any size for road and concrete work. Portable—Sold on a guarantee.

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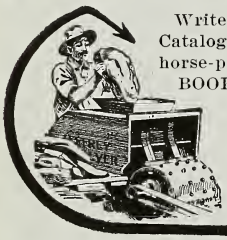

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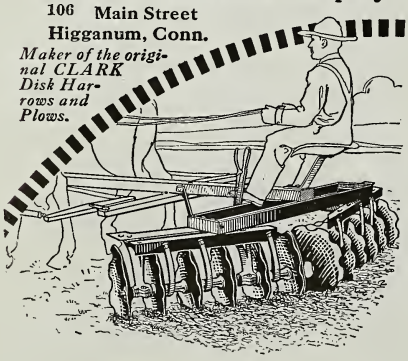

"Each for all and all for each," was the essence of the address given by L. O. Lantis of the department of rural economics to the winter course students on January 14. His subject, "Team Work in a Community," was thoroly covered as he showed how outside propositions are usually failures and that the reputation of any community is developed by those living within it. There must be leaders in the communities with strong characters, far-seeing visions, plenty of self-confidence and "a great deal of a man."

"We have some team work but there is not enough because of the lack of social spirit and the existence of "little groups.' More co-operation is needed between the village people and the rural communities. The real leader does not attempt too many things at once but rather develops one idea at a time. There must be more team work among the clubs, lodges, granges, schools and churches before any community can hope to have a reputation worth while." In closing he asked for a better acquaintance of the people of Ohio with the work of the agricultural extension department.

"If there were no bacteria there would be no farmers," said Dr. Morrey of the department of bacteriology in his talk to the winter course students on January 15. They are the smallest things that we know anything about and are of various shapes and sizes.

Most people have the idea that bacteria are dangerous and always the cause of disease. Dr. Morrey says that there are about 1300 kinds of known bacteria and that there are only about 30 that cause disease in animals and man. Most of them will live on only

one kind of animal and thus cannot be transferred from one to the other. Farmers ought to have less disease than anyone because they do not live in such close contact with other people.

"Most of the bacteria with which the farmer is concerned are beneficial. They take nitrogen from the air and add it to the soil, cure the hay, furnish all of our fuel, ripen the corn, flavor the silage and aid in the manufacture of butter and cheese. We know more about the injurious bacteria and not enough about those which are beneficial."

"I give credit for most that I have been able to do to that man who was my best friend when I was deep in debt," says W. D. Zinn of Phillipi, W. Va., in his address to the winter course students on January 16. Mr. Zinn was born on this hillside farm which he now owns. He began teaching school at the age of 15 and when his father died he inherited 21 acres of wet, acid soil. Eleven acres of this was his mother's dower. There was a mortgage on this but he bought from the other heirs until he was over $4000 in debt.

Drains were laid, these being made of three poles (two in the bottom and one in the top), lime was applied, acid

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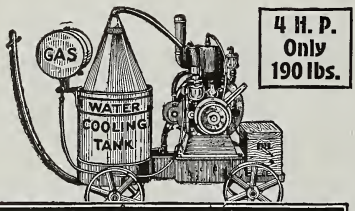

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phosphate was purchased, organic matter was turned under in the form of cover crops and this old hillside farm was gradually becoming productive and profitable. The rotation now followed consists of corn, wheat or rye, clover or alfalfa with a little timothy. Wheat gets an application of 250 pounds of acid phosphate in the fall and 250 in the spring when the clover is sown. Corn is fertilized at the same rate.

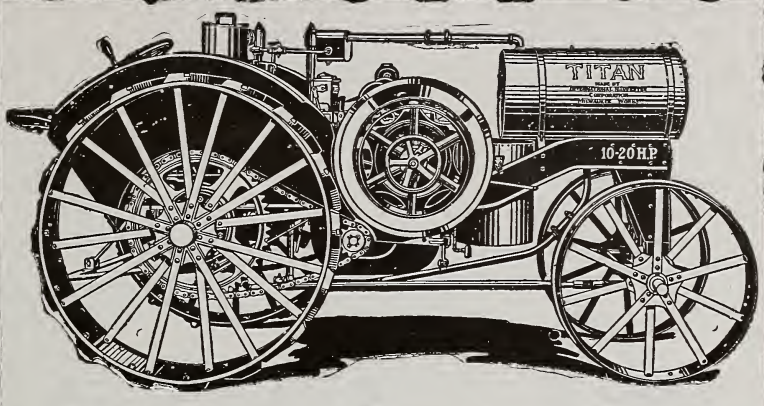
All of the division fences have been removed and the cattle are pastured on a permanent bluegrass on another farm. He is now feeding 130 head of cattle on his 93-acre farm. He advises people not to make the mistake that he did for a long time,—keeping any kind of breeding animal. Mr. Zinn says: "It will pay you to sit on the fence once in a while and philosophize. Have a little talk with the old farm."

Meadows and Pastures.

In his second talk on January 17, Mr. Zinn made the statement that there is not an acre in Ohio that should not produce three tons of hay in a normal season.

He told about one man who had increased the hay crop on 1 acre from ½ ton to 7200 pounds by the use of the double disc in the spring and the application of 2 tons of limestone and 300 pounds of acid phosphate. "It is never right to pasture a meadow or to let it run so long it that is a poor sod. Meadows should not be fertilized before the hard freezing is over," says Zinn.

A mixture which he highly recommends for the establishment of a permanent pasture is 4 pounds each of timothy, orchard grass and red top; 2 pounds each of red clover and alsike; 7 pounds of bluegrass and ½ pound of white clover.



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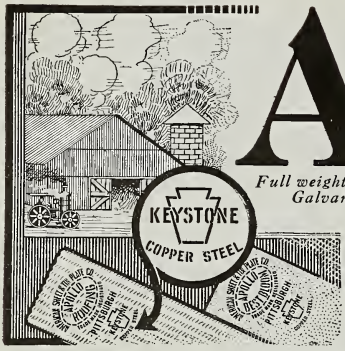

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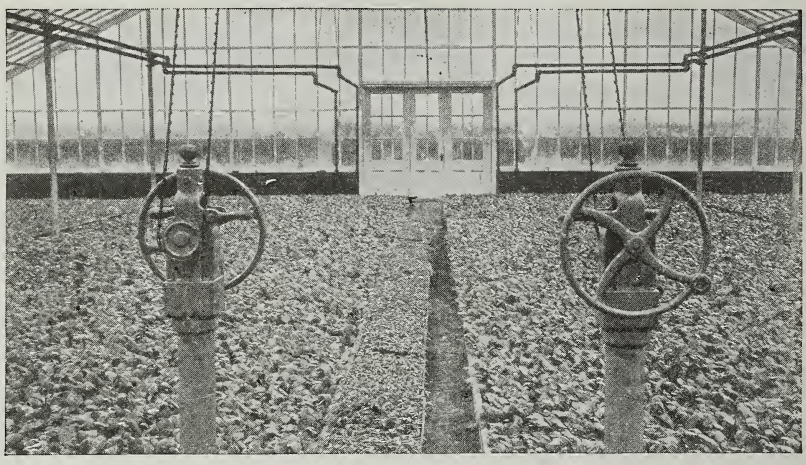

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